ELECTRICAL REVIEW

ILLUSTRATED.

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VIEWS, NEWS AND INTERVIEWS.

Arc light carbons frequently possess characteristics of the diamond, to which in composition they strongly approximate. The pieces of unburned carbons which are thrown away are often found to contain very hard, sharp ends which will cut glass, and the mischievous street Arabs have discovered this fact and use the pieces for defacing windows and doing other destructive work.

A laborer takes a contract to set up some telegraph poles, digs the holes, leaves them open and unprotected, girl breaks leg, sues telegraph company, gets verdict, Court sets it aside and gives judgment for the company, saying the girl must sue the laborer, who alone is accountable. Grand walk around by Judges, directors and counsel to the favorite air:

"Hoppity, skippity, row-de-dee! You can't break a girl's legs vicariouslee."—*The Evening Sun.*

The female spotter has been getting in her work on the electric car conductors in Atlanta, Ga., and several of them have been sent to hunt for other jobs. The female spotter has to make a pretence of earning her pay, whether she sticks to the truth or not. A woman, and a pretty woman at that, who will enter upon such service is not apt to have very strong conscientious scruples about the sort of charges she brings against the men she shadows.

In the opinion of President Roberts, of the Pennsylvania Railroad Company, electric railways are the thing needful for promoting the spread of Philadelphia, and the insurance of safe, cheap, practicable and immediate rapid transit.

It is again rumored in financial circles that the Thomson-Houston and Westinghouse interests will unite.

In a paper on "Birds Attracted by the Rays of Liberty's Torch," read by Jonathan Dwight, Jr., before the American Ornithologists' Union, it is stated that the bright electric light in the hand of the Bedlow's Island statue is peculiarly destructive on account of its location.

"It flames out at the junction of two different tides of migration, that which follows along the Sound and that which comes down the Hudson. The greater number of the birds are killed in the fall, especially late in September and early in October. Very few perish in the Spring migrations. Three hundred and forty-six birds were killed in 1890, 386 in 1891. In all previous years the Maryland yellow-throats have furnished about 60 per cent. of the victims, but this year they have been in the minority."

The conditions favorable to a large slaughter, he said, were a windy, cloudy night with a sudden lowering of the temperature. October 28 was such a night, and 75 birds were killed. So far, but one duck has been found. Another peculiarity is that nearly all the birds strike either against the northeast or the southeast side of the statue.

In accordance with a time-honored custom it will probably be cold this Winter. Electric cars need electric heaters. "Forewarned is well-warmed."

Young Americans imbued with the true spirit of scientific inquisitiveness will take warning from what happened to George Ellison, of Logansport, Ind. George is 14 years old. He stole into the power-house of the electric street railway company and began to experiment with the wires. He didn't recover consciousness for several hours, and his eyesight is gone.

Canadian Electrical Association.

The Canadian Electrical Association was formed at Toronto, November 26. After a constitution and by-laws had been adopted, the following officers were elected: President, J. J. Wright; first vice-president, H. J. Dunston; second vice-president, John Carroll; secretary-treasurer, C. H. Mortimer; executive committee, E. S. Edmonson.

FIG. 1.—A CORNER IN THE ASSEMBLING ROOM, ELEKTRON MANUFACTURING COMPANY, SPRINGFIELD, MASS.—(See Page 212.)

Oshawa; H. O. Fisk, Peterboro; W. A. Johnson, Toronto; S. J. Parker, Owen Sound; A. B. Smith, Toronto; D. Thompson, Hamilton; Thomas H. Woodland, Hamilton; A. A. Wright, Renfrew; John Yule, Guelph.

It was decided to hold the first annual meeting of the Association in Hamilton, on Tuesday, June 2, 1892. After the election the executive committee met and transacted a large amount of preliminary business. The assembly was enthusiastic throughout. Almost every branch of electrical science was represented. There is every indication that the general meeting will be both interesting and successful.

A Good-Sized Check.

(From the New York *Metropolis.*)

This week a check for $1,000,000, drawn by August Belmont & Company, in favor of the Westinghouse Electric and Manufacturing Company, passed through the clearing house. Very few of us are able to draw a check for a round million, and even the clerks, to whom millions are common, stared at this bit of paper curiously.

Thomson-Houston International Electric Company.

This company has appointed the Toronto Construction and Electrical Supply Company, Limited, of Toronto, Ontario, its exclusive selling agents for the Dominion of Canada. The Toronto Company has its main offices and show rooms at 63-69 Front street, Toronto, where may be seen a specimen line of apparatus, consisting of dynamos for arc lighting of the celebrated Wood system, which the International Company exclusively controls for the Canadian territory, dynamos and transformers for alternating current lighting, dynamos for direct current lighting, reciprocating rock drills, pumps, and other mining machinery, the Thomson recording watt-meter, now extensively used on the circuits of all systems of lighting and power, and also a full line of the supply material manufactured or dealt in by this company.

The Toronto Company will have a competent corps of engineers in its employ thoroughly conversant with the systems above mentioned, and will be prepared to make studies and undertake engineering work for central station or isolated lighting, street railways and mining work.

Mr. Frederic Nicholls, the general manager of the Toronto Construction and Electrical Supply Company, Limited, is well-known in the United States, being a member of the executive committee of the National Electric Light Association, and having been a somewhat extensive purchaser of American electric manufactures.

Electric Linemen.

The convention of electrical linemen who have been assembled in St. Louis has completed its work by forming a national organization of electrical workers of America. This organization will immediately apply for a charter, and will send a delegate to the convention of the American Federation of Labor, to be held at Birmingham, Ala., next month.

Electric Railways in Berlin.

Electric railways are at present to the fore in Berlin, says London *Engineering*. Siemens and Halske's large project for a net of overground electric railways has been followed by another, at the head of which is a syndicate comprising several large industrial firms, who have already applied for concessions. A third plan, emanating from the large Allgemeine Electricitäts Gesellschaft, which supplies a great portion of the electric light used in Berlin, proposes a system of underground electric railways between the different parts of the town. This latter project comprises three different lines. One of these is to go straight from north to south, the other from east and west, the third is an interior ring line, proceeding from the Hallesches Thor, following Königsgrätzerstrasse, touching Potsdamer and Brondersburgher Thor, underground the whole way, then to Friedrichstrasse Railway station, over the Alexanderplatz and Moritzplatz back to Hallesche Thor. These three lines would be laid at different levels so as to avoid all complications. At the points where the lines cross each other it is proposed to combine the various stations by stairs. The north to south line will have double tracks, and although this is the highest level of the three, it will be nine metres below ground. This line, which it is intended to take first in hand, is proposed to be carried through an iron tunnel covered with cement. Its time of construction is calculated at two years. It is to follow the carriage road of those thoroughfares under which it runs, but it is distinctly stated that its building will in no manner interfere with the traffic. The well leading down to its starting point will be the only visible sign until it is completed. There are to be 14 stations, which are to be of two kinds. On such places where there is available space over ground, it is the plan to build waiting-rooms, from which, by steps or elevators, there will be connection with the station underneath. Where there is no such open space it is proposed to rent the ground floor of a house and transform it into a waiting-room, with similar connection as in the former case. It is proposed to run the trains every three minutes, each train to consist of an electric locomotive and three carriages, with aggregate accommodation for 120 persons. It is proposed to have a uniform fare of 10 pfennig (about three cents) for the whole line. The calculated cost is £600,000, which, it is understood, has already been secured.

Brooklyn Institute.

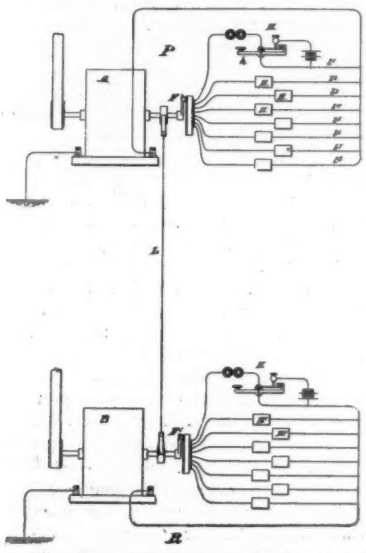
The third meeting of the season of the Brooklyn Institute of Arts and Sciences, was held on Friday evening, November 20, 1891, in the large hall of the Y. M. C. A.

A lecture by Mr. Edward H. Lyon upon "Electrical Measurements of Low Resistance" was given at that time, in the large lecture room of the Y. M. C. A. After mentioning the method of La Coine, Mr. Lyon gave a modification of this method, by which volts or amperes can be accurately determined to the third place of decimals.

The Brooklyn Institute having received an invitation to participate in the World's Fair, in accord with a resolution passed at the last meeting, the following gentlemen were appointed a committee to represent the electrical department: J. Stanford Brown, William D. Sargeant, W. S. Barstow, Edward F. Peck and F. V. Henshaw.

Bradley's Synchronous Telegraph.

An interesting patent for a system of multiplex telegraphy has been recently issued to Charles S. Bradley, the well-known electrical inventor. The system is a synchronous one, the synchronism depending upon the peculiarity of alternating current machines, one acting in the capacity of the generator, and the other in that of a motor, to run in synchronism. Two alternating current machines are placed at the terminal stations of the line and one of them caused to revolve mechanically by connecting to a steam engine or other source of power, the field magnets of the machine being excited by a small dynamo. The alternating current thus generated is conveyed over a connecting line to a motor similarly constructed, the field magnets of the motor being also excited by an auxiliary generator. If the armature of the motor be brought up to synchronism, as is well understood, so that its rate of alternation agrees with that of the generator, it will fall into step and continue to revolve at an exactly synchronous pace with the generator. Distributing apparatus is actuated by the two machines, so as to connect the line successively with each of a series of operating circuits in a manner common to a number of systems of multiplex telegraphy. An interesting modification of the invention is described by which the same line may be used to maintain the



BRADLEY'S SYNCHRONOUS TELEGRAPH.

two alternating current machines in synchronism and to serve as the telegraphic circuit. This may be accomplished either by devoting a part of the sunflower by which the current is switched successively into the operators' circuits to the exclusive use of the synchronizing current, or may be accomplished in a much neater manner by maintaining the synchronism of the machines by causing them both to act as generators, so that their currents will, when in synchronism, neutralize each other; thus little or no synchronizing current flows over the line and the latter is left free for telegraphic communication. This form of the system is illustrated in the accompanying diagram, wherein the two generators are precisely similar. The line wire is connected at its two ends with the distributors F F^1 and the current, after passing through the operators' circuits l, l^1, l^2, etc., passes to the generator and thence to ground. Thus the dynamos A and B are directly in circuit with the telegraphic apparatus, but since the currents produced by the two machines neutralize each other they do not interfere with the telegraphic transmission and the latter may be carried on in the same manner as if the line were actually dead. The two machines are independently actuated, of course, and simply offer at each terminal of the line opposing electromotive forces. The slightest failure of coincidence of phase will momentarily permit a little current to pass through the synchronizing circuit and restore the machines to accurate synchronism. Among other advantages claimed for this system is that, the alternations being generated at both ends of the line, difficulties due to static capacity will be reduced to one-half, and a line can be operated twice as long as if it were charged from one end alone. This patent contains several very broad claims covering the alternating current as a mode of synchronism for telegraphy.

LITERARY.

The Christmas number of *Scribner's Magazine* contains 10 illustrated articles, in which is represented some of the best work of well-known artists.

The heart of a woman must be pleased when she sees such a magazine prepared for her special pleasure as is the Christmas *Ladies' Home Journal*.

The December number of *The North American Review* brings to a close the one hundred and fifty-third volume of the well-known monthly, and contains a full index of the volume.

We have received "The Eleventh Census," an address delivered before the American Statistical Association, Boston, October 16, 1891, by Hon. Robert P. Porter, superintendent of census.

The *New England Magazine* for December makes its appearance in a delicate white cover, with gilt lettering. It is particularly well illustrated, and all the articles are interesting, without being slavishly Christmasy.

Robert J. Burdette, the humorist, is to go into the editorial harness again. With January 1, he will become a salaried editor on the staff of *The Ladies' Home Journal*, and will conduct a regular department in each issue of that periodical.

A well-known New York editor, in speaking of the new departure, "In a Corner at Dodsley's," now appearing each month in the *New England Magazine*, said that "there was not another column of literary criticism like it in the country." In the December number, Walter Blackburn Harte says, among other things, "that the day of literary men in literature is over," and "to succeed in literature one must nowadays first succeed in something else—in Wall street, on the turf, in society, railroading, anything that leads to eminence or notoriety—preferably the latter. "Dodsley's" should be read by all who like to read the opinions of a strong personality, fearlessly expressed.

The Inventive Age, Washington, D. C., is three years old, and shows enterprise and prosperity by building and occupying a handsome four story building on the corner of Eighth and H streets, Washington, D.C., just north of the Patent Office. *The Inventive Age* building will be devoted entirely to the business connected with that journal. One of the most interesting features of the building is the fact that the entire first floor is devoted to a scientific reading room, in which may be found all of the principal scientific journals published, together with a fine library of technical and scientific dictionaries and books of reference. The motive power used in the printing department is electricity, and the new buiding is complete in all of its appointments.

Thomson-Houston Carbon Company's Factory Burned.

The plant of the Thomson-Houston Carbon Company, at Fremont, Ohio, was partly burned the night of November 24. It is said that a watchman entered the plating room with a lantern and an explosion occurred, starting the flames.

The loss is reported as being $200,000, with an insurance of $120,000.

The following telegram to the ELECTRICAL REVIEW has been received:

CLEVELAND, O., November 25, 1891.

To the ELECTRICAL REVIEW, *New York.*

While we had a bad fire last evening, our stock room was safe with many millions of carbons. We shall be able to supply all our customers and others promptly. Shall rebuild at once.

Thomson-Houston Carbon Company.

The fire is especially unfortunate coming at this time of the year. The company will undoubtedly put a large force of men immediately at work and will soon have a plant better than the old one.

Extract from Treatise on Construction and Use of Drilling Machines.

ISSUED BY BROWN & SHARPE MFG. COMPANY, PROVIDENCE, R. I.

The change gears having been selected, the next step in cutting spirals is to determine the position at which the spiral must be placed to bring the spiral in line with the cutter as the work is being milled, for, if the spiral is not in line with the cutter the groove will not be cut to the shape of the cutter.

The correct position of the spiral bed is indicated by the angle shown at "A," Fig. 1, and this angle, as may be noted from that figure, has the same number of degrees as

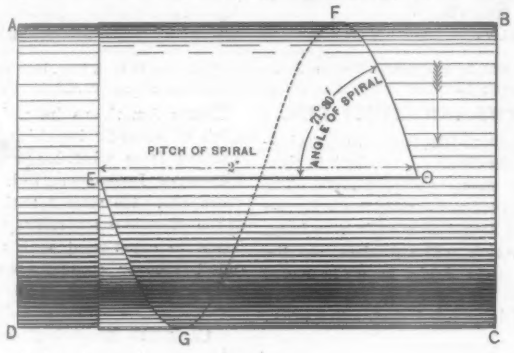


FIG. 2.

the angle "B," which is termed the angle of the spiral, and is formed by the intersection of the spiral and a line parallel with the axis of the piece being milled. The reason the angles "A" and "B" are alike is that their corresponding sides are perpendicular to each other.

The size of the angle of the spiral depends upon the lead of the spiral and the diameter of the piece to be milled. The greater the lead of a spiral of any given diameter, the smaller the angle, and the greater the diameter of any spiral the greater the spiral angle.

The angle may be ascertained in two ways, graphically, or more conveniently, by a simple calculation and reference to the accompanying tables. In determining it graphically, a right angle triangle is drawn to scale. One of the sides which forms the right angle represents the lead of the spiral in inches; the other side represents the circumference of the piece in inches, and the hypothenuse

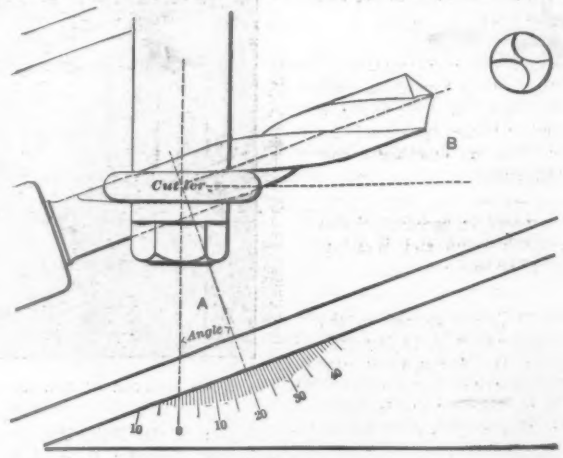


FIG. 1.

represents the line of the spiral. The angle between the lines representing the line of the spiral and the lead of the spiral is the angle of the spiral. This angle can be transferred from the drawing to the work by a bevel protractor, or even by cutting a paper templet and winding it about the work, as shown in Fig. 2. The machine is then set so that the spiral or groove as it touches the cutter will be in line with the cutter. Or the angle may be measured and the spiral bed set to a corresponding number of degrees by the graduations on the clamp bed.

The natural tangent of the angle of the spiral is the quotient of the circumference of the piece divided by the lead of the spiral. Accordingly, the second method of obtaining the angle of the spiral is to divide the circumference of the piece by the lead and note the number of degrees opposite the figures that correspond with the quotient in the accompanying tables of natural tangents, pages 155 and 156. The angle having been thus obtained, the spiral bed is set by the graduations on the clamp bed.

The Westinghouse Electric Works.

Whoever has watched the progress of the electrical industry in this country during the last five years, must acknowledge that its development has been a most remarkable one. Nowhere, perhaps, finds this fact a more striking illustration than in the growth of the factories of the larger electrical companies throughout the United States.

Where now immense establishments are giving occupation to thousands of hands, stood, less than a decade ago, an insignificant storeroom, or the laboratory of an ingenious mind engaged in evolving ideas, the realization of which has since made the electrical industry one of the most important in the world.

Take the immense establishment of the Westinghouse Electric and Manufacturing Company, at Pittsburgh, for instance. Less than five years ago its energies were confined to a small room of the works of the Union Switch and Signal Company, and it was then known as the electrical department of that company. But look at it today. The child has rapidly outgrown the parent. It stretched its limbs quickly over the entire works and absorbed room after room, until at last its vigor became too much for the parent, and the Union Switch Company had to move out. The old quarters were then re-arranged, enlarged and again enlarged, until the place now represents one of the busiest hives in that greatest of the world's industrial centers, Pittsburgh.

The main building, occupied by the Westinghouse Electric and Manufacturing Company, covers a considerable portion of a double square which has for its boundaries, Fayette street, Garrison alley, Duquesne way and Tenth street. Some of the departments, however, as there was no room for them here, had to be built along the Allegheny river front. The main building comprises two large structures, one of which is six stories high. It has a frontage on Garrison alley of 100 feet and runs back along Fayette street for over 200 feet. Every nook and corner of this immense structure, which is built of brick, has been utilized in some manner for the business of the company. The basement has been set apart as the storeroom. From the cellar up every floor occupies a different department of the works, representing within the whole an establishment of its own. On the ground

floor, as well as on the second floor, are the offices of the company besides several other departments. The laboratory is also on this floor and so is the drawing office.

The entire arrangement of the different departments of the works is based upon a system, which has been carried out so as to bring about the best results. Each department has its own foreman, who has immediate control over the men in his branch of the works. He issues the orders and he makes it his business to see that every one on his floor attends to his work. He examines everything turned out in his department, as he is held responsible for everything that has been made by his men. It is also worthy of notice that the conveniences of the workmen are in every way considered by the company. Each department has ample accommodations, such as a washroom, towels, etc., as well as the advantage of closets for clothing.

Adjoining the main building is the machine shop. This department is acknowledged by everybody, who has ever been inside of it, to be the most complete establishment of its kind in the country. It was designed by men who had long and practical experience in the operation of machine shops, and when the plans for this one were made, every detail that would add to the convenience and to an enhancement of the facilities was carefully studied out and utilized. The place is laid out on the ground floor of the building, consisting of three parts, the machine shop proper, the testing department and the erecting department. The advantage of this arrangement is, of course, readily appreciated, from the fact that it greatly facilitates the transporting of the machinery. Truck rails connect these departments and traveling cranes are running overhead to aid in this purpose. The building is lofty and has all the conveniences of excellent ventilation. Besides the fact that there is a glass roof, which can be opened, an immense ventilating pipe also traverses the entire length of the building. Inside of this pipe is a coil of smaller pipes, which is, in the winter, filled with hot steam. At one end of this pipe is a large fan, which blows the hot air out of the pipe into the place below, causing the atmosphere to be all the time of an agreeable warmth. During the summer cold air is pumped into this pipe and the fan drives the cooling breezes into the shop.

The machinery is placed in eight different rows and in a manner so as to afford plenty of space between them for the truck rails. These truck rails traverse the shop wherever required in transporting the material either to or from the machines. In addition to these rails are the traveling cranes. There are seven of them, averaging a capacity of eight tons, and by their aid the handling of the material is accomplished in the least time and with remarkably little labor.

Of machinery, of course, the shop contains the most complete outfit. All the necessary appliances incidental to the work manufactured by the company can be found here. Numerous lathes, drill presses, planers and boring machines are of the latest design and of the most modern make. The shop contains one 48-inch Johnson lathe, two six-foot radial drill presses and an eight foot planer. The testing floor has two 250 horse-power Westinghouse engines, one at each end. These engines are connected by one line of shafting and the arrangement is such that either one or the other or both of these machines can be operated at the same time. This testing floor separates the machine shop proper from the erecting floor, but all are connected by wide entrances, and as the material is turned out of one department, the truck rail or the traveling cranes convey them wherever they are wanted.

From the erecting floor another truck rail leads to the shipping department, where the goods are packed, boxed and then transported to the different railroad stations, *en route* for their destinations.

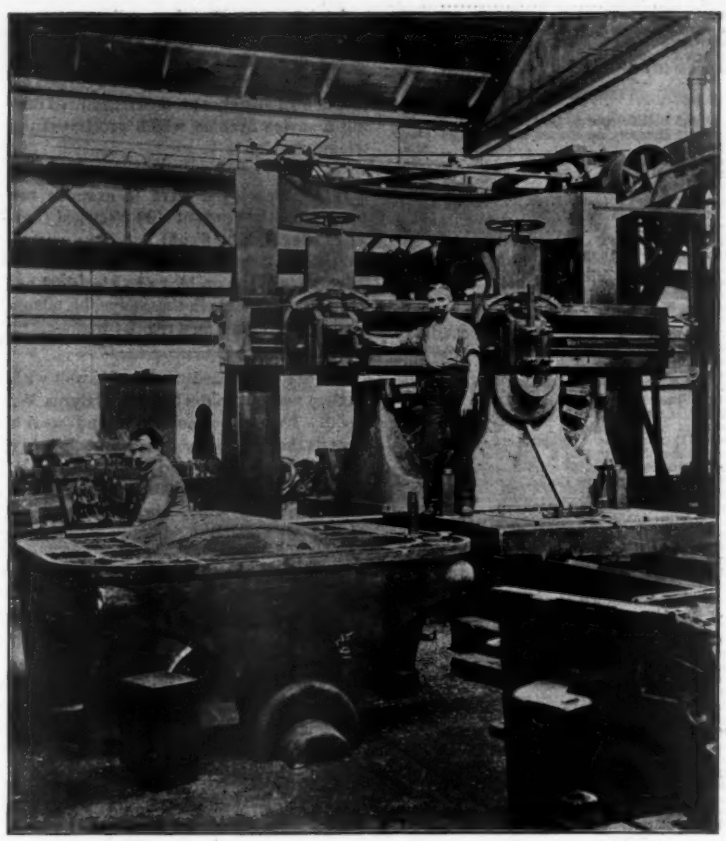


FIG. 1.—SCENE IN THE SHOPS OF THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY.—FIELD CASTING OF A 10,000 LIGHT A. C. DYNAMO.

FIG. 2.—PLANT OF THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, PITTSBURGH, PA.

Duluth, Minn.—Phœnix Electric Company; capital, $10,000.

Ypsilanti, Mich.—Ypsilanti Electric Company; capital, $25,000.

Bloomfield, N. J.—Eldridge Electric Company; capital, $100,000.

New York City.—Bronx Electric Light Company; capital, $15,000.

New York City.—The Acme Storage Battery Company; capital, $1,000,000.

Sioux City, Ia.—B. and S. Storage Battery Company; capital, $1,000,000.

Columbus, O.—The Columbus Auxiliary Fire Alarm Company; capital, $20,000.

Des Moines, Ia.—Des Moines Water Power and Electric Company; capital, $225,000.

Washburn, Wis.—Washburn Electric Light and Power Company; capital, $20,000.

Camden, N. J.—The American Standard Telephone Company, of the State of New Jersey.

New York City.—Williamsbridge, Woodlawn and Westchester Railroad Company; capital, $240,000. President, Herbert N. Curtis, 115 Broadway.

Hinsdale, Ill.—The Hinsdale Electric Light Company; capital, $12,000. Incorporators, Horace Jackson, George D. Robbins and George M. Bogue.

Cleveland, O.—The Cleveland Electric Lighting Company; capital, $100,000. Promoters, A. L. Bassett, C. E. Shattuck, Chas. H. Gill, R. A. Curran and H. C. Bemts.

Mechanicsville, N. Y.—The Mechanicsville Electric Light, Heat and Power Company; capital, $25,000. Promoters, Cornelius R. Sheffer, Stephen Lee, Joseph H. Pacher, all of Mechanicsville, N. Y.

Virginia City, Mont.—Southern Montana Telegraph and Electric Company; capital, $25,000. Promoters, Henry Elling, W. J. Bennett, Barclay Jones, George Sohn and John Mitchell, all of Virginia City, Mont.

Paragould, Ark.—Paragould Electric Light and Power Company; capital, $6,000. Promoters, C. Wall, W. C. McDonald, M. F. Callier and A. Bertig. Incorporation papers sent to M. F. Callier, Paragould, Ark.

Velasco, Tex.—The Velasco Ice, Light and Refrigerator Company; capital, $50,000. Promoters, J. Hamilton, J. A. Patton, H. Prince and C. A. Zilker, all of Houston, Tex. Incorporation papers sent to C. A. Zilker, Velasco, Tex.

Chicago, Ill.—Railway Electric Lighting and Heating Company; capital, $500,000. Promoters, F. C. Rutan, Louis Spahn, John G. Campbell, all of Chicago, Ill. Incorporation papers sent to F. C. Rutan, 85 Dearborn street, Chicago, Ill.

Philadelphia, Pa.—The Torresdale Electric Light and Power Company; capital, $1,000. Promoters, Henry V. Massey, Jas. Jardin, Jr., Samuel F. Gillies, all of Torresdale, Philadelphia, Pa. Incorporation papers sent to Henry V. Massey, Philadelphia, Pa.

Point Pleasant, W. Va.—The Point Pleasant Electric Light and Power Company; capital, $50,000. Promoters, D. S. Snyder, of Point Pleasant, and F. M. Durbin, Geo. E. Milligan, W. R. Milligan and E. F. Lathrop, of Parkersburg, W. Va. Incorporation papers sent to N. Miller, Parkersburg, W. Va.

Chicago, Ill.—The Chicago Boulevard Electric 'Bus Company; capital, $100,000; to build and operate electric carriages and other vehicles to be propelled by electric batteries or other electric appliances upon the boulevards in the city of Chicago. Incorporators, Harrison B. Meech, Frank B. Meech and Frank Meech.

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No attention will be paid to communications for the REVIEW without the *name and address of the writer.*

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If St. Peter should prove to be an electrician, how many scientific (?) writers for the daily press would pass through the golden gates?

It has been predicted that the day is not distant when parent companies will handle all or nearly all the electrical supply business. It is certain that the supply business just now is passing through a metamorphosis.

The Electric Club of this city has been particularly fortunate in its choice of lecturers and lectures, and, with one recent exception, has not been made the medium for unwelcome prominence of commercial matters. It is to be hoped that the entertainment committee of this most excellent and progressive institution will see that the good work of the past years continues in the same desirable lines.

It begins to look as if Electricity would be the main feature of the World's Columbian Exposition at Chicago in '93. This fair Goddess will bear her honors with becoming modesty and can be depended upon to do her part.

Again we note that the excellent construction of the long distance telephone lines between New York, Washington and Baltimore enabled conversations to be carried on and news dispatches to be transmitted during a severe cyclone which prostrated the telegraph wires.

If a phrenologist were to examine the bumps on the heads of 100 electrical engineers, we think he would fine the predominant characteristic to be "adaptability." To solve some of the problems an electrical engineer has to tackle in these days, his adaptability bump must be a regular wen.

The whole civilized world will await with anxiety news from the bedside of Cyrus W. Field. The man whose faith and wealth gave us the Atlantic cable receives and richly deserves the esteem and sympathy of all. The ELECTRICAL REVIEW earnestly hopes that Mr. Field will soon be restored to health.

The Commissioner of Patents in his annual report states that the total number of applications received was 45,914; number of patents granted, 25,807; trade-marks and labels registered, 2,033; patents withheld for non-payment of fee, 3,514; patents expired, 12,383. The total receipts were $1,802,749.39, and the expenditures $1,145,502.90, leaving a surplus of $157,291.69.

Business men in the electrical field are seriously considering the advisability of forming a mutual protective association. The broad vistas leading to dollars opened up by electrical development have attracted many men who live by their wits, to put it charitably. They are undesirable acquisitions, and if watched would soon convict themselves. A system of espionage over these gentlemen, or a black list which could be depended upon, would be of great value to the business interests of the field.

Prof. William Crookes, presiding at the third annual dinner of the British Institute of Electrical Engineers, presented the great task and possibility of science in these words: "It has been computed that in a single cubic foot of the ether which filled all space there were locked up 10,000 foot tons of energy which had hitherto escaped notice. To unlock this boundless store and subdue it to the service of man is a task which awaits the electrician of the future. The latest researches give well-founded hopes that this vast storehouse of power is not hopelessly inaccessible."

THE ELECTRIC LOCOMOTIVE.

The electric locomotive for handling freight cars, described in this issue of the REVIEW, is a departure from the ordinary way of using electric motors. The plan pursued in steam locomotives, of having one motor engine for a number of cars, becomes in freight traffic an important necessity, for the reason that the independent equipment with motors of every freight car would preclude the application of electricity to this kind of traffic on the ground of economy. The time will, doubtless, come when all railway traffic will be handled by electrically operated trains. While this is a somewhat distant field of application, there are many instances where a locomotive could be used to advantage for handling loaded and empty freight cars, and where the additional power needed to furnish the current would not require a great outlay. In addition to the cheapness of construction of the electric locomotive, as compared with the steam locomotive, it commends itself because expensive skilled operators will not be needed to manage it.

WHAT ELECTRICITY WILL DO AT THE WORLD'S FAIR.

Commenting on the transmission of electrical power 105 miles, from Lauffen to Frankfort, the *Mail and Express* recently said that the day might not be so far distant as many supposed when the force of Niagara Falls would be employed to generate electrical power which would be conveyed and utilized over a vast area. Now, we hear that it is proposed to drive the electrical exhibit at the World's Fair by electricity generated at Niagara. The distance is 475 miles. The scheme does not seem impracticable, in view of the Frankfort experiment. The idea is a grand one, and, if carried out, would do much to place the fair in the front rank of world expositions.—*N. Y. Mail and Express.*

We predict that electricity will be the feature of greatest interest and importance at the World's Columbian Exposition. The recent experiments in electric power transmission at the Frankfort Electrical Exhibition were entirely successful. It is but a question of detail to increase the distance over which power may be carried. From Lauffen to Frankfort is 108 miles. From Niagara Falls to Chicago is about 475 miles. Large turbines and generators at Niagara, a carefully protected and well insulated line of heavy copper, and a motor plant at Jackson Park, will do the business. Of course, this project needs much money and careful engineering to bring it to full success. Inestimable benefit would accrue to electrical interests as a result of such a demonstration.

As regards electric lighting, development in that line is so constant that it is well nigh impossible to predict what may be the state of the art when the World's Fair opens. We may see a building illuminated by glow lamps without circuit wires, after the plans of Mr. Nikola Tesla.

Electric traction will probably be well nigh perfect by the end of 1892. Many bright minds are puzzling over the storage battery problem; it is an enigma which may be practically solved at any hour. The recent production by the Thomson-Houston Electric Company of an electric locomotive capable of drawing nine loaded freight cars is, indeed, an advance. It is undoubtedly the forerunner of an electric machine which may displace the steam locomotive. The underground conduit system of electric street railway propulsion is also in the field for future recognition.

Visitors to the World's Fair will see applications of electric power for manufacturing purposes which will be truly astonishing.

Our predictions are not the vagaries of a phantom prophet, but are beliefs founded firmly and solidly upon an abiding faith in that mysterious agent whose manifestations are so wonderful and about which we have learned so much and know so little.

TO CENTRAL STATION MEN.

We desire to urge those central station men who are not already members of the National Electric Light Association to immediately join that organization. It will pay you to be a member in full standing at the Buffalo convention, in February, which bids fair to be the most successful, from a practical standpoint, of any convention ever held.

The electric lighting business is one of the immense industrial interests of this country to-day, and it is still growing at a wonderful rate. It is right and necessary that such an interest should be represented and protected by an association like the National Electric Light Association.

But no organization can become powerful without a large membership and the thorough co-operation of its members. You do not need to be told of the advantages of this membership. The advantages increase each year. All you probably need is some such word as this to remind you of the importance of joining the ranks of this influential and progressive association.

Much of the present progress in electrical matters is due to our technical schools and colleges from which many of our brighest men have graduated. Technical institutions are at all times worthy of the support of practical and scientific men.

CORRESPONDENCE.

OUR ALBANY LETTER.

Mayor Manning has approved a resolution to furnish and equip 31 additional electric lights for the city of Albany.

The Steuben Street Branch line of the Albany Railway is completed, excepting the poles and wires. Cars will probably begin running on it the middle of next month.

The Office of the Postal Telegraph Company in the capitol is to be removed from its present location to the southern end of the assembly chamber front lobby, where the Western Union office was first located.

Mr. John Taylor, the inventor of the Taylor electric motor truck, who has been chief draughtsman of the Gilbert Car Manufacturing Company, of Troy, N. Y., has resigned from that position. His present address is No. 98 Ninth street, Troy.

A Telephone Line is now being constructed between Wilson, Ransomville and Lewiston, N. Y. It will be ready for use this winter. It is now reported that a new telephone line will be built next Spring from Lewiston to Suspension Bridge, thence to Lockport, N. Y.

The Albany Railway has completed its new Steuben street branch to connect with the main line at Eagle street and Washington avenue, as far as the tracks and poles are concerned, and the overhead wiring will soon be begun. A great deal of interest centers in the laying of the new telephone conduits, as every additional length laid shortens the days of the overhead wire nuisance, and when the system of wiring is completed, Albany will have a telephone service unexcelled in this country. Thus far there has been laid over 47,000 feet of 3-inch conduits and over 44,000 feet of 2½-inch conduits, a total of over 90,000 feet, on Broadway, North Pearl street, Maiden Lane, Washington avenue and Swan street, at a cost of nearly $30,000. The company is now about to contract for cables and for masts upon which the cables are to be strung. The company expects to be in its handsome, new building about May 1. The expenditure made on the company's plant, which includes the new building, will not fall far short of $150,000. L. M. W.

Albany, November 28.

OUR CHICAGO LETTER.

The Electric Appliance Company report having secured the general Western agency for the Swinging Ball lightning arrester and Walker ammeter.

The Great Western Electric Supply Company are filling large orders for their Sun arc lamp which is successfully being used on incandescent circuits. Their new lighting catalogue is now ready for distribution.

George Cutter has just captured the Chicago Edison Company's order for 1,000,000 feet of No. 14 wire for indoor circuits, and as the result Simplex braided rubber wire will be used in a large number of the new skyscrapers which will adorn the World's Fair city.

The Electric Merchandise Company, on account of increased business, find it necessary to have more room than they now occupy and have secured the flour above their present place, at 11 Adams street, which they are rapidly fitting up with new offices. They will use the first floor for salesrooms in the future.

The Western Electric Company are rushed to their full capacity in order to supply the demand for their well known goods. Among the many new contracts they have just closed is one to install an electric light plant at Muncie, Ind. They have just completed a plant at Davenport, Iowa, consisting of 186 arc and several hundred incandescent lamps.

The Bureau of Construction of the World's Columbian Exposition have contracted for a 400 horse-power Armington & Sims engine for use in connection with their temporary light and power plant. The engine was shipped immediately, and is probably in operation by this time. The matter is in the hands of the Pond Engineering Company, general Western agents for the Armington & Sims engine. M. J. B.

Chicago, November 28.

OUR BOSTON LETTER.

The W. S. Hill Electric Company, this city, has issued a neat catalogue (illustrated) of its electrical machines, appliances and supplies, including a number of new specialties never seen before by the electrical trade.

The Consolidated Electric Manufacturing Company, this city, is enlarging its show rooms by taking possession of the large store adjoining its present premises at the corner of Franklin and Congress streets. The company has issued a new catalogue and price-list.

Another Electric Club will probably be inaugurated in this city within a few weeks. Its name, it is said, will be the New England Electric Club. Mr. Mabin W. Brown is said to be the prime mover in working up the organization of the proposed new club.

Mr. H. C. Spaulding, for several years past prominently identified with various departments of the Thomson-Houston Electric Company, has resigned and will embark in a private enterprise at once. Mr. Spaulding has many friends among the electrical fraternity in this city and throughout the country; all will wish him success in his new field of labor. W. I. B.

Boston, November 28.

OUR LONDON LETTER.

Berlin.—The municipal council have favorably considered plans which have been submitted for an electric boat for passenger traffic on the river Spree.

Kapp's "Electric Transmission of Power."—From Berlin a German edition of this book is announced. It is translated by Dr. Holborn and Dr. H. Kahle and published by Mr. Julius Springer.

Lightning.—Under this title a new electrical weekly has been brought out, with Mr. Frank B. Lea, late of *Electrical Plant*, as the editor. There are a number of interesting serial articles on elementary subjects and a useful glossary of electrical terms, and altogether every promise of success. C. F.

London, November 20.

The Berliner Patent.

Our esteemed contemporary, the New York *Times*, takes us to task for not knowing all about the Berliner patent before it was issued by the Patent Office. The daily papers were so full of nonsense about the fundamental telephone patent that the REVIEW was led to point out the absurdity of the talk about its extension. After the REVIEW was on press, the Berliner patent was issued and became a matter of public knowledge, and in commenting on the patent we said that if Berliner or his assignees had acted with diligence the patent could not be condemned because of the delay. The *Times*, with an air of great wisdom, assures us that:

"The letter of Examiner Bissing to Commissioner Simonds shows that the application 'hung fire' for at least nine years because of an interference with another application also owned by the Bell Company. The history of the case indicates that the company played one application against the other to cause delay, and Examiner Bissing asserts that, so far as he can learn, there was no excuse for the delay from October 23, 1883, to November 16, 1888, the application having been more than 11 years old at the latter date."

The REVIEW does not profess to know what created this long delay. It has tried to get at the record of the Berliner case, but the patent office is so busy furnishing the *Times* or somebody else with certified copies that it has, as yet, been unable to learn the character of the numerous adventures of the application. The letter of Examiner Bissing does not warrant the conclusion of our contemporary. The following is quoted as being part of that letter:

"This application has been pending 14 years; the delay in its prosecution for the first four years was due to the number of interferences in which it was involved. The rule of practice at that time required an interference between applications which disclosed the same subject matter, even though their claims could not conflict. This rule has since been changed, and I doubt if any of these interferences would have been declared at the present day. *The office delay from October 23, 1883, to November 16, 1888, should not*, so far as the records are known to be, have occurred. Such delay would certainly not occur under the present practice of the office. Since March 6, 1888, the prosecution of this application and of the interference application, on which the issue of this application depended, has been prompt and vigorous."

The italics are ours. The statement is that the *office's* delay between 1883 and 1888 "should not, so far as the records are known to be, have occurred." What the significance of the remark just quoted may be, the REVIEW cannot say; one would ordinarily take the language to mean that the patent office was dilatory. On the whole, it would be foolish to follow the *Times'* example and condemn the patent and everybody connected with it until the premises are reasonably clear. If the delay can be shown due to laches of the assignees, the courts will, no doubt, mete out a punishment to fit the crime.

EMINENT ELECTRICIANS.

FACTS ABOUT FAMOUS MEN WHOSE NAMES WILL ADORN THE ELECTRICITY BUILDING AT THE WORLD'S FAIR.—BY DR. P. H. VAN DER WEYDE.

IV.

Gilbert—William (1540–1603); English physician and physicist. Studied and graduated at Cambridge, then traveled on the Continent for a few years and then settled in London, as physician, in 1573, where, by his eminent success, he was appointed as royal physician by Queen Elizabeth, who afterwards gave him a pension so as to enable him to devote himself to electric and magnetic experiments, of which the result was the publication of his famous treatise on magnetism, published in 1600, written in Latin, and at once republished in France and Germany. Its merits are that it contains the account of original experiments with magnetic bodies and the first demonstrations given that our whole earth is a gigantic magnet. Seeing that his book was so extremely well received among all scientists in Europe, he continued his experiments in electricity and kept up, according to the customs of that period, a scientific correspondence with *savants* in different parts of Europe, from which correspondence it is proved that he intended to add considerably to his book by the publication of his later experiments. This plan he never executed, as he soon afterwards died. (For a few more details, see article on "Electricity 150 Years Ago," in the ELECTRICAL REVIEW for October 17.)

Sturgeon—William (1783–1859); English electrician. Began life as an apprentice shoemaker, enlisted as a private in the artillery and occupied all his spare moments with electrical experiments and reading accounts of electric discoveries, such as those of Oersted, Ampere and Arago. He made the first iron horseshoe electro-magnet and then improved upon the rotary cylinders of Ampere. Then he furnished some papers on electricity to the *Philosophical Magazine*, and in 1825 he devised an electro-magnetic motor, for which the Royal Society gave him 30 guineas and a silver medal. Then he became professor of physics in the East India Military Academy, at Addiscombe, and at last lecturer on science in the Royal Victoria Gallery, in Manchester, where he died.

Saussure, de—Horace Benedict (1740–1799); Swiss physicist. Studied natural sciences under Bonnet and Huller, and was appointed professor of physics in Geneva at the age of 22. He occupied himself especially with the investigation of atmospheric electricity, and for this purpose made a series of very extensive mountain excursions in the Alps, but only after he had himself thoroughly prepared and furnished with improved instruments, such as electrometers, hygrometers, and some other instruments newly invented by him, such as the cyanometer and diaphanometer. He crossed the Alps 14 times by eight different routes; he ascended Mont Blanc as well as Monte Rose; encamped for 17 days on the Col de Géant; he visited the Jura, Voiges and the mountains of Auvergne, and then all the principal and highest mountain peaks of Germany, England, Sicily, with its Etna, and Italy, with its Vesuvius. The result of such an indefatigable energy by a man of his knowledge and deep insight, could not otherwise than exercise a most profound influence on the development of science in general, as he recorded his invaluable information in four volumes, "Voyages dans les Alpes," published 1779–1796, in which he does not confine himself to any special branch of science, but goes also over the field of geology and meteorology, with its details about cloud and fog formation, rain and thunderstorms, etc. At the end of his life he was professor of natural history in the central school of Leman at Geneva.

Guericke—Otto von (1602–1686); German physicist. Born in Magdeburg, Saxony, studied mathematics and mechanics at Leyden, Holland, and made himself well acquainted with the hydraulic engineering works of that country, its pumping engines, saw and flour mills, all driven there by wind power, for reason of the total absence of water power in that flat country, while steam power was not yet born and remained unknown for nearly a whole century more. Then he visited France and England, as these countries also were, in that respect, far ahead of his native land, and he wanted to prepare himself well for his chosen calling, that of mechanical engineer. It should not be forgotten that at this period (1625) traveling was slow and uncomfortable, so that it was quite a task to reach the objects of his research, which were then as rare and far between as they are now abundant over all the civilized world. At last, he returned to Saxony and established himself as a mechanical engineer at Erfurt. He soon distinguished himself so much that in 1646 he was elected mayor of his native town, Magdeburg, where he devoted his disposible time to scientific research. Instigated by the experiments of Gilbert and his contemporaries in the then so new and attractive field of electricity, he was the first to make a machine for the production of resinous or negative electricity. For this purpose he had made to order a globe of glass, as they were then in use for the production of vitreous or positive electricity, but of very thin glass, and after he passed the axle through it he filled it with melted sulphur; when this was cooled and solidified, he broke the glass and so had a globe of sulphur which, when revolved while submitted to the friction of the hand, gave him negative electricity in great abundance, a method which furnished to him and other investigators the means of studying and comparing the difference and mutual relations of the two electricities. He verified by observations the law that bodies equally charged with the same kind of electricity repel one another, when charged with opposite kinds attract one another, and when unequally charged with the same kind also manifest attraction. His most important contribution to science was, however, in the field of pneumatics, and consisted in improvement in air pumps by which he produced a vacuum nearer to perfection than before his time had been accomplished, and so prepared the road to the study of electricity in vacuo, which was further pursued by Nollet and others (see ELECTRICAL REVIEW for November 21, pages 182–183), and culminated in the success of the incandescent lamp 200 years later. The striking experiments he made to demonstrate atmospheric pressure may be called classical, and his so-called Magdeburg hemispheres are described in all text-books on physics, and no collection of physical apparatus is considered complete without them and the other adjuncts of the air-pump, which are mainly due to the genius of the man who, at the occasion of a visit of the Emperor, Ferdinand III, and other royal German rulers, assembled in Regensburg, exhibited two such hemispheres of almost 20 inches diameter, which he calculated that when exhausted would undergo a atmospheric pressure of 2,700 pounds. Here he exhibited his engineering talent. He found that the traction of a horse is about equal to lifting directly 170 pounds, and calculated that eight horses could not pull them apart, but that it would require 16 horses to do it. This was fully demonstrated by the exhibition referred to, when the separation produced by 16 horses gave a sound like the discharge of a gun. Those experiments excited, naturally, a sensation over all Europe, at a time that even *savants* had not the least conception of atmospheric pressure at all, much less of its power; while thinking electric investigators became aware that all knowledge of mankind about the existence of electricity is due to this pressure of a non-conducting atmosphere, and that when this pressure is removed by the air-pump of Otto von Guericke, the electricity will flow off, be dissipated and escape our observation as soon as developed.

The above information is obtained from "Ottonio de Gueriche Experimenta Nona Magdeburgica de Vacuo Spatio." Published in Amsterdam, 1672, lib. iii, cap. 23, 24, 25.

International Telegraph Statistics.

London *Iron* says that Luxembourg is the European country possessing the greatest number of telegraph offices in proportion to its superficial extent. It has on the average one of these useful institutions to every 17.16 square miles of territory. In other European countries the proportion is as follows: Belgium, one to 19.07 square miles; Switzerland, 20.24; Germany (including Bavaria and Wurtemburg), 20.56; Great Britain, 26.86; Netherlands, 28.62; France, 34.81; Italy, 48.12; Austria, 51.36; Denmark, 66.05; Hungary, 115.86; Portugal, 193.43; Greece, 218.36; Servia, 260.05; Sweden, 274.19; European Turkey, 277; Roumania, 283.55; Bosnia and Herzegovina, 312.55; Spain, 317.5; Montenegro, 393.05; Norway, 564.93, and, finally, Russia, which (including Siberia) has but one telegraph office for every 3,700.5 square miles of land. With regard to the average number of telegrams despatched per 100 inhabitants, Great Britain takes the lead with 164 telegrams, the figures for other European countries being as follows: Switzerland, 89; France, 88; Netherlands, 62; Belgium, 61; Norway, 55; Germany, 45; Denmark, 43; Greece, 34; Turkey, 30; Luxembourg, 28; Italy, 27; Sweden, 27; Roumania, 22; Bulgaria, 22; Spain, 21; Austria, 21; Hungary, 20; Servia, 17; Portugal, 15; Bosnia and Herzegovina, 13, while in Russia the average number of telegrams per 100 inhabitants amounts to 10 only.

Telephonic News

*** The Law telephone system may be adopted at Albany, N. Y.

*** The Erie Telephone sub-companies made a net gain of 83 subscribers in October. The total number connected November 1 was 13,816.

*** The application of the Sunset Telephone and Telegraph Company for a franchise for maintaining a system of underground conduits for its wires in Los Angeles, Cal., has been granted.

*** The lines of the Long Distance Telephone Company are now being run between Altoona and Tyrone, Pa. From there they will be run down the Bald Eagle Valley, taking in Bellefonte, Lock Haven and Williamsport.

*** Thomas C. Smith, in his suit against the Western Union Telegraph Company, which was tried before Judge Biddle, at Philadelphia, last week, sought to recover $5,000 damages for the failure to deliver, on the day of its receipt, $100 sent to the Philadelphia National Bank for the payment of the plaintiff's note, which became due on that day. Smith says that the tardiness of the telegraph company caused the note to be protested, with the result of injuring his credit and financial standing. The jury rendered a verdict for $1,000 in favor of the plaintiff.

Concerning C. H. Lawrence.

C. H. Lawrence was the "promoter" of the Lockport, N. Y., Electric Street Railway, Light and Power Company. He also is the United States Railway Equipment and Construction Company. He had drafts cashed by New York business men. The drafts, in several instances, went to protest.

Last week Mr. Lawrence was arraigned at Lockport on a charge of grand larceny, preferred by S. D. Phillips of that place. He was later released from jail on a bond secured by a lot of poles and ties which he had purchased in Canada, but had not paid for.

It is understood that Lawrence is "promoting" several railway schemes in the South. A number of firms of engineers and supply men in New York and Chicago can tell tales of interest relating to their experiences with Lawrence.

Like Salem's Witchcraft of Old.

Electricity played some queer pranks at Porter's meat market, in Salem, Tuesday afternoon, says the Boston *Transcript*. On the roof of the market building is a clothes line. During the rainstorm a towel blew from this line onto an electric lighting wire below. Being wet it wound around the wire and the electricity passed through it and shot down into the ground, where it came in contact with the water pipes leading into the building. Along the pipes it scampered, and the first thing it met in the basement of the building was a pot of hot lard, which was boiling on the stove. It illuminated the lard, and the young man in charge thought it must be burning. He started to remove the pot from the stove and received a shock that landed him against the basement walls.

Pale with fright, he rushed upstairs, where a fellow workman, noting his blanched appearance, reached for the water faucet to get a glass of water. No sooner had he touched the faucet than he had occasion to pick himself up from a far corner of the room.

For a few moments everything seemed turned into an electric battery. The nails in the wall became red, electricity flew from water pipes and flashed around the iron bands on water pails. At last the cause of the trouble was ascertained and the towel removed.

A Berlin Telephone Exchange.

The illustration on this page shows the interior of an operating room in one of the telephone exchanges in Berlin which is fitted with multiple switchboards of the Western Electric Company's pattern and make, and which gives a good idea of the general appearance and method of operating a first-class modern exchange. We are indebted to London *Industries* for the picture.

In this instance preparation has been made for 5,000 subscribers, who are apportioned amongst 25 complete multiple sections, each sufficing for 200 subscribers. Besides this, there is provision for 1,000 outgoing trunk lines which are connected to each of these boards, so that each board contains 6,000 spring jacks or plug holes. Further, the incoming trunk lines, of which there are 500, are apportioned in sets of 50 amongst 10 other complete multiple sections, making in all 35 sections, so that each subscriber can be reached in 35 different places independently.

This exchange is worked on the single cord system—that is, each of the 200 subscribers' lines on any section of the board ends in a plug at the end of a flexible cord, the operator having the means of inserting her instrument in the subscriber's line on his dropping his indicator before it reaches the cord. Having ascertained his wishes, she then takes up the plug and inserts it in the spring jack required. This is an alternative method to having only a certain number of double flexible cords with a plug on each end which can be used for any subscriber. When once clearly grasped, the plan in which all the connections are made is sufficiently simple, but the enormous mass of detail work it involves can be gathered from the facts that in this instance nearly 45 kilometres of 43-wire cable and one kilometre of 21-wire cable were used for making the connections behind the boards. The wire in these cables is covered with cotton and silk, and attains a total length of 1,901 kilometres. To make all the various connections required also necessitates 773,000 soldered joints. Well may such a maze be compared to a system of nerves. Fortunately, when once the board is connected up properly the wires are at rest, and, therefore, there is little tendency to get out of order, but from the particulars given, some idea may be formed of the care and precision needed in arranging these cables so that all the ends may be got at in case of faults, and that access to the backs of the spring jacks to which the wires are connected may also be obtained.

It will be noticed that the exchange is a hall in itself, is handsomely decorated and comfortably furnished, and is brilliantly illuminated by arc lights, so that everything has been done to make it as complete as possible. Besides this exchange there are in Berlin two others nearly as large, having a capacity for 4,000 and 3,800 subscribers, respectively. In these three exchanges there is thus provision for 13,800 subscribers, or about twice the number connected in the London district, although the population of Berlin is only one-third that of London.

At Hamburg is another similar exchange, but for 5,400 subscribers. In this case the switchboard is erected in two different rooms, which demonstrates clearly how the component parts can, though united in one whole, be worked separately from each other.

Interior of a Berlin Telephone Exchange.

Reuben and the Telephone.

The telephone is generally conceded to have stirred up more rows and provoked more naughty words than any other modern invention, not barring the "L" road in Battery Park, says the New York *Morning Advertiser*. Two men were in the Tombs Police Court yesterday on account of the telephone. They were Reuben Pearl, of No. 110 East One Hundred and Fifth street, and Isaac Bamberg, a salesman for Blumenthal Brothers, of No. 412 Broadway.

Pearl is a cigar peddler. Those employed at Blumenthal's say he is an insufferable bore. He drops in at Blumenthal's about once a day, always tingling for an argument of some kind. When he called Thursday he was prepared to bet $5 that Acker, Merrall & Condit sold 50,000,000 cigars a year. Bamberg, goaded to desperation, offered to lay $2 that the firm did not sell $10,000 worth of cigars annually. Pearl rang up Acker, Merrall & Condit and spent a half hour trying to get some one to answer the call. When some one did answer he told Pearl to mind his own business. If Pearl was mad at the delay, he was madder at the answer. He was chaffed by all in the office, and when some one asked him to stand aside he swore. He wanted to fight, and, picking up a chair, whirled it around. The blow fell square on Bamberg's head. Then Bamberg reciprocated several times with the office poker, and wound up by casting Pearl out of doors.

Pearl, still in a bad humor, had Bamberg arrested, charging assault and battery. When Justice Divver heard the story, he discharged Bamberg and read Pearl a lecture, taking for his text a quotation from Acker, Merrall & Condit's telephone: "Mind your own business."

OBITUARY.

Mary S. Field, wife of Cyrus W. Field, of Atlantic cable fame, died November 23, at her country home at Irvington-on-the Hudson. Mrs. Field was prominent in New York charities. Her loss will be greatly mourned.

New York Electric Club.

A joint meeting of the Electric Club and the American Institute of Electrical Engineers was held at the house of the Electric Club, Tuesday evening, November 24. Mr. Carl Hering read an address illustrated with stereopticon views. The title of the address was "Notes on the Frankfort Electrical Exhibition."

A large number of members from both organizations attended. Among those present were: Professor E. J. Houston, Philadelphia; Nikola Tesla, F. R. Upton, Luther Stieringer, Allen R. Foote, Felix Gottschalk, Professor F. B. Crocker, Dr. Wangemann.

Mr. T. D. Lockwood acted as chairman. A meeting of the Institute Council was held at the club house at 5 P. M.

Thomson-Houston Electric Company.

It was believed at the beginning of the year, says the Boston *News Bureau*, that the Thomson-Houston Electric Company would earn this present fiscal year from $2,000,000 to $2,500,000 net, or not far from $1,000,000 above all dividend requirements. Of course, it was not expected that the phenomenal earnings of $3,000,000 net, made last year, were to be repeated this year, but it now looks as if $2,500,000 net might be reached the present fiscal year ending February 1, 1892, or more than $1,000,000 surplus over the $1,240,000 required for dividends upon the present basis.

There is, therefore, good basis in earnings for expectation by Thomson-Houston stockholders of something more than $4 per share from present earnings. Below is a comparative statement of the business of the Thomson-Houston Company for the three months ending October 31, 1891 and 1890, and for the nine months ending same dates in 1891 and 1890. The profits shown, however, are for the Boston office only.

Quarter ending October 31:

	1891.	1890.	Inc.	Dec.
Gross sales.	$3,098,573	$2,785,073	$313,500	
All exp. and com's.....	2,273,408	2,078,886	194,522	
Net profit...	$825,165	$706,187	$118,978	

Nine months ending October 31:

	1891.	1890.	Inc.	Dec.
Gross sales.	$7,163,411	$7,514,520	.....	$349,109
All exp. and com's.....	5,600,628	5,888,431	.....	287,803
Net profit...	$1,562,783	$1,626,089	.....	$63,306

The Recent Storm.

The cyclone which struck Washington and Baltimore and passed over New York on Monday, November 23, did much damage to telegraph wires.

Mr. Angus S. Hibbard, general superintendent of the American Telephone and Telegraph Company, said: "The long distance telephones lines stood the storm remarkably well. We had no wires blown down, but a few instruments at Washington were burned out by lightning. The Western Union and Postal wires were all down. News dispatches were sent by telephone from Washington to Pittsburgh and telegraphed from there to New York. We were on the alert for trouble all day, but our construction work proved equal to the attacks of the cyclone."

W. C. Humstone, of the Western Union Telegraph Company, said on Tuesday that the storm had done considerable damage to the wires.

They were straightening out the difficulties and hoped to have everything in good shape by that evening.

To the East the company was about 26 wires short. There were breaks between Providence and Boston, and Springfield and Boston, while there was one line down between this city and Williamsbridge.

To the West the wires were in good shape as far as Syracuse. From that point to Buffalo there were six wires working, three of which go through to Chicago.

To the South the wires were in good order to Baltimore, but between that city and Washington many wires were down, while south of Washington one wire was in working order. To Pittsburgh and Cincinnati things were in fair shape, and much of the Southern business was handled over these routes.

A Public Telegraph.

BY EDWARD EVERETT HALE IN "THE COSMOPOLITAN."

The American rule seems to be that if the service required is one which everybody needs, everybody, or the public, may undertake it to general advantage. Water, for instance, is needed by everybody. There are people like Gallet, the buffoon, of whom it was said that since he came to the age of reason he had never drunk a glass of water. But even Gallet had to be washed sometimes, and you cannot be washed without water. Everybody who is not blind needs light in the streets. Everybody needs education. Everybody needs security to property. So the public undertakes water works, street lights, schools and registration, just as, long ago, it maintained forts, roads and lighthouses.

It, therefore, follows, by a general common law, that as the telegraph proves itself a general necessity, the suggestion is made more and more definitely that the government shall assume the oversight of the telegraph and make the telegraph a part of the mail service. The mail service is carried on in America so well that all the declamation, which is only too familiar, about the inability of government in such directions is silenced. The European governments, precisely because they waited rather stolidly at the beginning, have now gladly and successfully assumed the charge of the telegraph; and the American traveler, accustomed to brag about the railway system of his country, finds to his disgust, when he comes back from Europe, what he had, perhaps, never noticed before—that he cannot use the telegraph here as he does there; that when he uses it it is badly administered, and that, practically, nobody is responsible for errors.

The people and clubs who discuss nationalist theories will do well if they will make common cause this Wipter in sustaining Mr. Wanamaker's plans for connecting a telegraphic service with the post office. As the matter stands it is, naturally enough, the policy of the "Western Union" to discourage the people who are served by the small offices. Those offices, in fact, are essential to a general system and make the prosperity of the large offices. But it cannot be expected that a private corporation shall look with favor on them. In the hands of the United States government, and in immediate connection with the post office system, no one would object to them. There would be no cost for their rent, and gradually the post office officials, or a part of them, would be trained to telegraphy.

Another advantage of the first importance would be the improvement in the grade and qualification of the telegraph agents. Now, when the company is often obliged to employ at the smaller stations young women who have no training but the manual training needed to handle the instrument, they do not get intelligent service. But the postmaster, even of a small village, has to be a person of intelligence. He would not look you in the face and ask where Philadelphia is, or spend 10 minutes looking in a book to find what was his rate to New York.

To the general public, also, it is an important consideration that, under our system, a person employed by government is always civil, even courteous. He knows that, in a way, his place may depend on the man he is talking to. The telegraph operators of a private company will, on the average, never come up to the standard of people engaged by government and determined to keep their places. And any person who meets stupidity, indiffence, ignorance or rudeness at a telegraphic bureau must remember that his real remedy is to transfer such service to the hands of the courteous Uncle Sam.

I have never seen this courtesy of public officials spoken of as I think it should be. I do not like to ascribe it simply to selfishness. It seems to me to belong rather to the great underlying principle on which republics are based—namely, a determination of each man to live in a larger life than he is in and to bear his brother's burdens. I have knocked about a good deal in different States of this Union. I have been uncivilly treated very often. But I cannot recall a single instance in which, at a public office, where the officials were appointed either directly or indirectly by the people, I have found anything but courtesy and a willingness to advance my purpose. I remember particularly going into the office of the Secretary of State in Texas, an utter stranger. I wanted to conduct difficult historical inquiries there, which could not have had any particular interest to the officials whom I met. They knew nothing of me nor my designs. But I spoke the English language and they knew I was an American. It was understood at once that the remarkable manuscript treasures of that department were to be placed at my disposal, and they were placed at my disposal, with every facility for their use. What a contrast this with the difficulty which surrounds any student, even with the best recommendations, when he wishes to examine the archives of any government in Europe! I refer it to the principle of which I have spoken. It seems to me to belong to the habit of mutual help or co-operation, which is essential if we mean to have what we call a commonwealth.

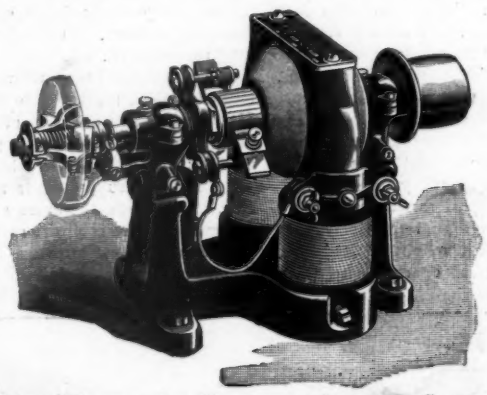
Now, it seems to me fair to compare this with the petulance, the arrogance and the ignorance which one so often finds in the offices, say, of the telegraph companies or of an incorporated bank. The official in either of these places is a person who has been appointed for private purposes. His own individual horizon seems to be the horizon of his own comfort. He does not want to help forward the visitor who comes in. He wants to earn his own salary and to get home as early as he can to smoke his cigar or to read his novel. I do not say that such an official always treats you rudely. In four cases out of five he does not. But in the fifth case you get the surly half-answer of a person who cares nothing about you or your affairs. He wishes you had not come in, he hopes you will go out, and he does not mean, if he can help it, that you shall come in again.

This indifference to the convenience of the public goes so far in the service of the Western Union Telegraph Company that the general supposition among what I suppose I ought to call laymen in this affair is that that company does not wish to keep up the small offices. It is probable that its profit appears to be made in the large accounts of the large offices in the large cities. It is easy enough to see that large business firms who send off hundreds of despatches a day are better customers than the "transients" who send, perhaps, a dozen despatches a day to some local station. Then the local station is kept up with difficulty. Its accounts have to be examined and studied with just as much care for their sixpences as if they were the majestic accounts of the large central offices. And naturally they fall into disfavor in the eyes of managers. The public is invited to make complaints of any failure in service and administration. But most of us who have anything to do with that know that nothing ever comes of the complaint, and, indeed, how should it? The report on the subject is to be received from the person who made the blunder and very little can be expected of remonstrance in such directions. The United States government has learned—indeed, all civilized governments have learned it—with regard to the post office, that it is the little streams which fill up the large rivers. The post office work between Boston and New York would be materially reduced by any misfortune which should cut off of a sudden the communication to Boston or to New York of all the little wayside offices. The government has learned by experience, if it did not learn it from St. Paul, that if one member suffer all the members suffer with it, and that it is desirable for the integrity and health of the whole body that the circulation of the smallest member of that body shall be kept in perfect order. This is not a truth which has yet dawned upon the officials of the Western Union Telegraph Company; it can hardly be expected that it shall dawn upon the officials of any private company.

Of the United States also it can be said that, in a long series of years, have been established the offices at Big Bone Lick and at Cranberry Centre, all over the nation, which shall receive and shall forward the letters and other "mail matter" for every individual citizen of the nation. I have had occasion in these articles before to say that this is the most majestic system of public education which was ever set on foot anywhere. The grandeur of the provision by which a miner in Montana may receive, at an easy distance from his own cabin, the largest and most elaborate book which he wants, at a cost almost nominal, is something which was never conceived of, excepting in a republic. If such things are done anywhere else in the world they are so done because a republic pointed the way.

As Uncle Sam, then, has the offices established as he has, and must have the officers who are to maintain these offices, any intelligent inhabitant of the planet Mars or any of the angels in the host of heaven who have to attend to such matters, would certainly say that the true method of administration would place in the hands of those officers, at those offices, the administration of the telegraph, which is a public convenience, and which is maintained only because it is a public convenience.

The managers of the Western Union Telegraph Company cannot have their cake and eat it, too. In this world nobody can. This is either a corporation for the public service or it is not. If it is for public service, it would seem to follow that the public, by its own officers, ought to control, direct and administer it. If it is for private service, it follows absolutely that every telegraph post set up in a highway must come down, since it is only because these are for public uses that the permission to use the highways is given to them. These highways, let it be remembered, are the property of the citizens who live on the two sides of them. The public has a right of way, which belongs to every individual person who makes up the public. By a very severe strain, the courts have ruled that the transmission of intelligence over these highways is to be governed by the same principle with which a man transports his own person over the highway. But this involves the supposition that the use made is a public use. For a private use, no separate State, under the Bills of Rights of our States, is able to give to the telegraph company the permission to put up these poles or to carry these wires. Thus is it that the courts have long ago decided that these great corporations only exist as servants of the State and of the Nation, for certain public uses which it is supposed they are carrying out to advantage. It follows that the moment the State or Nation chooses to take into its own hands the administration of these public duties, it may do so, acting on precisely the same principles in which first the State and then the Nation took in hand the public purposes of the post office.



CROCKER-WHEELER ARC MOTOR WITH AUTOMATIC GOVERNOR.

TELEGRAPHIC

.... It is reported that the English government will build a telegraph line to Jupiter Inlet, and the Western Union Company will extend its line from Orlando, Fla., to connect at the inlet.

.... It is proposed to lay a submarine cable from the mainland to Goto Island, Japan, and thence to the Loochoo Islands. The estimated cost of the work is over $2,000,000. The laying of the submarine cable between Echigo and Sado Island is now completed, and the line will shortly be opened to the public.

.... The Central District and Printing Telegraph Company, of Pittsburgh, will establish an exchange at Reynoldsville, Punxsutawney and Du Bois, Pa. One has already been established at Brookville. By next summer there will be connection with all of the principal points of Jefferson County and with New York and Pittsburgh.

Edison Mutual Telegraph Company.

The annual meeting of the Edison Mutual Telegraph Company was held at the office of the company at Van Wert, O., last week. Two vacancies in the directory had occurred in the past year by the deaths of Col. I. N. Alexander and Dr. H. C. McGavren. These vacancies were filled by the election of Edward Gilmartin, of Fort Wayne, and Dr. G. W. McGavren, of Van Wert. The officers and directors of the company, as elected, are as follows: Hon. Titus Sheard, New York, president; Geo. R. Sheldon, New York, vice-president; Geo. W. Beers, Van Wert, secretary-treasurer; Edward Gilmartin, Fort Wayne, Ind.; Gen. A. V. Rice, Ottawa; Dr. G. W. McGavren, Van Wert; G. L. Marble, Van Wert.

Crocker-Wheeler Constant Current Motors.

The Crocker-Wheeler Electric Motor Company, New York, have experimented upon every possible form of governor for arc motors, and now offer a complete series of machines from one-eighth to five horse-power, which they have found to govern promptly, without sparking, and to be thoroughly satisfactory in every way. They can be obtained wound for any circuit, the company keeping them in stock for 6.5, 9.5 and 18 amperes. All sizes above and including one-fourth horse-power are furnished with automatic centrifugal speed governors, as shown in the accompanying illustration, while the one-eighth and one-sixth horse power sizes have regulators to be moved by hand or treadle. The large sizes can be provided with the hand or treadle form of regulator, if so ordered.

The hand regulator controls the power and speed of the machine from full power to zero, and at zero automatically cuts the motor out of circuit. A spring is attached which gives a tendency towards zero, so that if the motor is neglected or the regulator not held in the power-giving position by the treadle, the motor is stopped and cut out of circuit. In starting up, the first motion of the regulator restores the motor to circuit and then gradually reduces its power.

Motors provided with the hand regulators are suitable for all kinds of work requiring variation of speed, driving of sewing machines, elevators, etc.

The automatically regulated arc motors are provided with an effective centrifugal governor similar to that of a steam engine. Its construction is extremely solid, the governor being directly upon the main shaft of the motor, which is extended in its full diameter to carry it. The tension of the governor spring is controlled by a heavy nut upon the extremity of the shaft, working on a fine thread, by which the nicest adjustments are attainable, and the motor may be set to govern at any speed. These motors, with the automatic governor, are suitable for all kinds of work which require steady speed.

* * Fostoria and Findlay, Ohio, may be connected by an electric railroad.

* * The plant of the Lowell, Mich., Electric Power Company will be ready for operation by January 1.

* * It has been decided that electric cars may be run on the streets of West Bay City, Mich., without conductors.

* * J. Wahl, superintendent of the Rochester, N.Y., electric railway system, has resigned his position, to take effect December 1.

* * Charles S. Wieland, of San Francisco, is successfully operating an electric launch, 34 feet long, 8 feet wide, and having 24 inches draught.

* * The Norwich, Conn., Street Railway Company has decided to adopt electricity as a motive power if the city government will give permission.

* * With electric lines of railway projected to Westerville, Worthington, Delaware, Newark and other points, Ohioans seem to be on the eve of an era of five and ten cent travel to almost any locality within 40 miles of Columbus.

* * The Accumulator Company, of Philadelphia, has sued the Dubuque Street Railway Company, of Dubuque, Ia., in the Federal and State courts to recover $50,000 for a storage battery electric car equipment. The street railway company claims that the cars were a failure.

* * There is now in use on the west side of Shaft No. 3, at Streator, Ill., a 60 horse-power electric locomotive that makes trips nearly a mile from the shaft, gathers up from 18 to 25 mine cars weighing a ton each and lands them at the cage, in from 12 to 15 minutes, displacing at least 12 mules and 8 men.

* * The stockholders and directors of the Norwich, Conn., street railway company have unanimously voted to ask the mayor, aldermen and common council of Norwich to grant the company the privilege to introduce electrical rapid transit immediately on their lines in that city. When the permission is granted the work of preparation will begin at once.

* * The injunction obtained by the St. Paul Railroad Company against the Milwaukee and Wauwatosa Rapid Transit Company having been dissolved, the rapid transit line will be completed just as soon as the weather permits. It is not likely that very much can be done before Spring, but it is expected that the road will be completed early in March. The company has decided to use the overhead electric system.

* * The engines for the power plant now being erected by the Lynn and Boston Railroad Company will have 350 horse-power each at first, with space to increase the capacity to 500 horse-power. The foundations for these machines are now going in, and they are solid blocks of granite, weighing several tons each. The machinery will be in running order before Spring. The Peabody line of this road is now nearly equipped for electricity, the poles being all set.

* * The success of the Brooklyn and Coney Island Railroad in getting permission to extend its trolley road into the city proper has aroused all the other Brooklyn surface railroads, and their presidents have sent a communication to the aldermen asking for a hearing on a petition to change their motor power from horses to the trolley system. This was signed by Benjamin F. Lewis, Henry W. Slocum, William Richardson and John N. Partridge. It was referred to the law committee.

AN ELECTRIC FREIGHT LOCOMOTIVE.

SUCCESSFUL TEST BY THE THOMSON-HOUSTON COMPANY AT LYNN, MASS.

The electric motor has been doing such excellent work in street service and has so well demonstrated its capacity to handle heavy loads in all conditions of operation, that it is not a surprise to find that it is now to be practically applied to an exceptionally heavy grade of work, namely, the shifting of freight cars in yard service for making up trains. A machine has been built by the Thomson-Houston Motor Company for the use of the Whitin Machine Company, of Whitinsville, Mass., where it is proposed to carry freight cars loaded with merchandise back and forth from the railway station, one and one-half miles distant from the company's works. This locomotive was tested at West Lynn, on Saturday last. A large party of invited guests, including the Editor of the REVIEW, left Boston at 2 P. M., by way of the Boston, Revere Beach and Lynn Railroad, to witness the test. The locomotive was put into actual service on a side-track leading into the factory of the Thomson-Houston Company. The locomotive was first coupled to two cars loaded with pig iron, weighing, respectively, 31½ and 23 tons, or a total weight of 54½ tons, and without apparent effort carried them back and forth. The current was at first led to the locomotive from an overhead wire, which was of temporary construction; in order to give a wide range of movement a heavy cable was afterwards used and permitted to drag over the ground. In a second test two more cars weighing 18¾ and 23¾ tons were coupled to the others, making a total weight of 96 tons; in a third test two more were added weighing 35¼ and 32 tons, respectively, making a total of 163¼ tons; this added to the weight of the locomotive, 21½ tons, made an aggregate weight of 184¾ tons. The motor responded instantly to the work, although working at thrice its rated capacity, over a grade of about three per cent. and a curve of 150 feet radius.

The locomotive is illustrated in the accompanying engravings. The motor is of the well-known "G" type of the Thomson-Houston Electric Company, the armature operating upon the rear axle through double reduction gearing. The rear drive wheels are coupled to the front wheels by heavy parallel rods, after the fashion of steam locomotives. The frame of the motor has a flat bed for carrying loads, with a cab at the rear for protection of the operator and the current controlling apparatus. The trolley employed is of the type used on the Thomson-Houston mining engines, being a parallelogram of pivoted levers supported upon a rigid post carried by the locomotive.

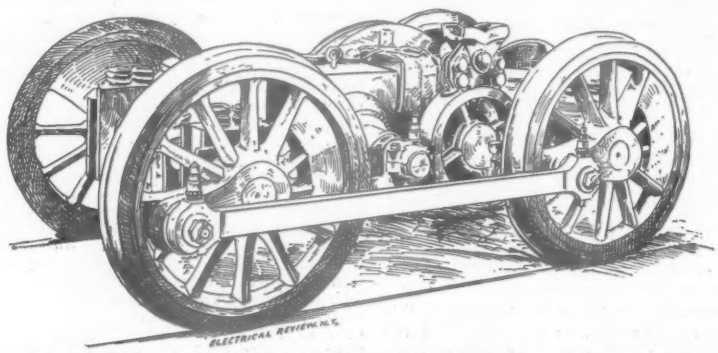


FIG. 1.—TRUCK OF NEW THOMSON-HOUSTON ELECTRIC FREIGHT LOCOMOTIVE.

The total weight of the locomotive is 43,000 pounds, and the speed when delivering 80 horse-power at the draw bar is about five miles per hour. The construction is of the strongest kind.

The motor consists of wrought iron field magnets, which are bolted to magnet yokes of cast wrought iron. One of these yokes carries the bearings which support that end of the motor on the axle, while the other yoke is spring-supported from the other axle. This keeps the gears always in line and meshing correctly with each other, and at the same time provides considerable spring support for the motor. The gearing consists of aluminium bronze pinion and wrought iron gear wheels. This gearing runs in gear cases in which a plentiful supply of grease is placed. This decreases the noise, friction and wear, thereby increasing the life of the gears very materially. On the intermediate shaft is heavily keyed a wrought iron brake drum, which is covered with wood lagging. It is embraced by two half bands of steel, tightened upon it by means of the brake drum lever, situated in the operating stand. The driving wheels are 42 inches in diameter and are heavily steel tired. The frame consists of two heavy side plates, in which are located the main axle bearings. Two heavy cast iron end plates on which are cast the cow-catchers, are bolted to the side plates by means of heavy through bolts. These end plates carry the heavy spring draw bars and bumpers.

The controlling mechanism consists of two large rheostats so arranged with their contact shoes that no reversing switch is needed. The operator so stands that he always faces in the direction in which the locomotive is to go, and being in this position he pushes the rheostat lever from him to make the locomotive go forward, and pulls it towards him to make it go backward. A positive center lock is provided, so that in turning the current off there is no danger of passing the neutral point on the rheostats, and so reversing the locomotive with the current on.

When the operator stands in the above mentioned position he pushes the brake lever from him in order to apply the brake. The bands are so arranged on the brake drum that the friction tends to tighten them up more upon the wood lagging and so assists the operator in braking the train. A combined main switch, lightning arrester and fuse box is placed within easy reach of the man, so that he can instantly shut the current off from the locomotive by a slight movement of the hand.

The motor is waterproof, the field spools having their wire enclosed and entirely sewed up in canvas bags, which are covered with a heavy coating of waterproof paint.

The locomotive is designed to operate with a current of 500 volts, developing 100 horse-power at the draw bar, and capable of maintaining a speed, when developing this power, of five miles an hour. The drive wheels are 42 inches in diameter. The speed reduction between the armature and axle is 25 to 1. The extreme length of the locomotive is 15 feet 9½ inches, and greatest width 7 feet ¼ inch. The locomotive was built under the supervision of J. P. B. Fiske, of the Lynn factory of the Thomson-Houston Company.

Captain Eugene Griffin, vice-president of the Thomson-Houston Electric Company, expressed himself as follows: "We are very much pleased with the success of our experiment and the way it has been received. The building of an electric freight locomotive is but a step toward the construction of a high speed electric passenger locomotive. It is much easier to build an electric motor to run 100 miles an hour than to build one to run three miles an hour."

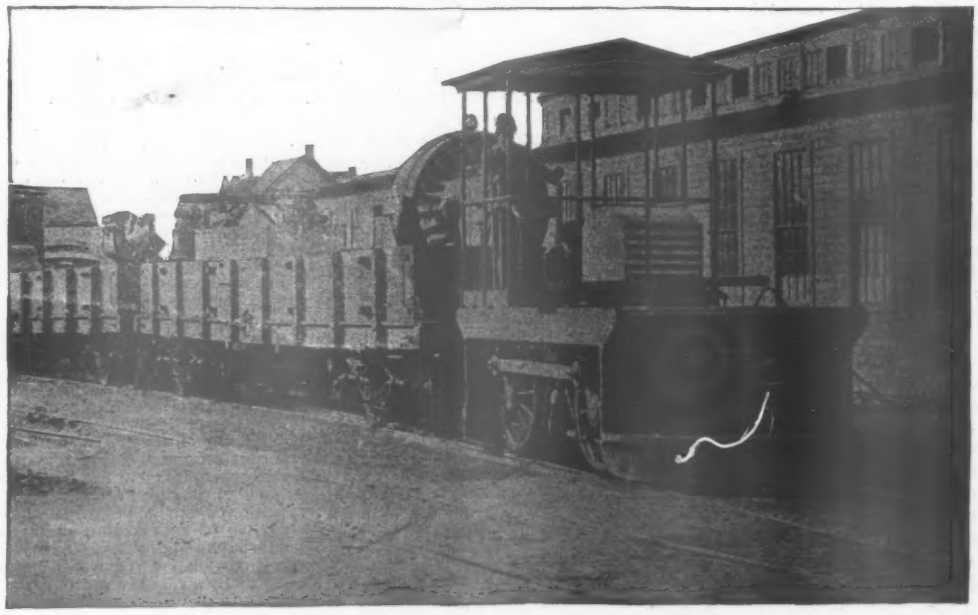


FIG. 2.—NEW THOMSON-HOUSTON ELECTRIC LOCOMOTIVE HAULING FREIGHT TRAIN.

PICK-UPS AT THE THOMSON-HOUSTON FACTORY.

The Thomson-Houston Electric Company have about completed two large electric hoists for use in the mines at Neihart, Mont. The motors are 100 horse-power each and are of the multipolar type.

The Thomson-Houston Electric Company

have completed a mining locomotive of 80 horse-power for the Forest City mine in Pennsylvania. It is capable of drawing 120 loaded coal cars. It stands only 38 inches above the rails and is provided at each end with two powerful incandescent lamps for head-lights, so connected that the forward lamps are always kept aglow. The machine weighs 11 tons and can maintain a speed of 10 miles per hour.

The following gentlemen were present at the test of the new electric locomotive at the factory of the Thomson-Houston Electric Company, at West Lynn, on Saturday, November 28:

Frederick H. Nazro, Boston; J. M. Rodocanachi, Boston; W. E. Worthem, New York; C. A. Baldwin, Boston; W. S. Key, Boston; Thomas Trisilian, Boston; C. E. Morse, Lynn *Press;* H. B. Prindle, Boston; T. H. Knox, *Railroad Gazette;* W. C. English, *Iron Age;* W. S. Richards, *Manufacturers' Gazette;* Fred. Ford, Boston *Transcript;* A. Wainwright, Edward Fuller, Providence *Journal;* Robt. H. Read, ELECTRICAL REVIEW; H. G. Lord, *Textile Manufacturing World;* T. W. Sprague, Boston; R. G. Fessenden, Boston; J. W. Ayres, Boston *Journal;* Amos N. Basson, Boston; C. W. Barron, Boston; W. G. Fancett, Boston; Geo. Wallace, Boston; C. O. Jackson, Boston; Albert Thorndike, Boston; R. L. Bridman, Lynn; Leander Sprague, Boston; R. L. Bridgman, Boston; Chas. C. Coffin, Boston; H. L. Shumway, Boston *Herald;* E. V. Cavell, *Street Railway News;* New York; G. W. Parker, Boston; F. A. Martin, *Commercial Bulletin;* W. I. Barker, ELECTRICAL REVIEW; Professor Thomson, Chas. J. Van Depoele, E. W. Rice, Jr., Chas. B. Martin, G. F. Baker, D. M. Barton, G. E. Emmons, A. L. Rohrer, W. P. Knight, H. G. Reist, Axel Eskstrom, J. P. B. Fiske.

The interesting process of electrically welding together parts of projectiles for use in the United States Navy was shown in operation. The shells, although masses of steel three inches in diameter, were united in less than a minute. A collation was spread in the office of the company, where the guests were received by the officers of the company before returning to Boston.

Exhibit of the Thomson-Van Depoele Electric Mining Company at the Augusta Exposition.

One of the most attractive electric exhibits at the Augusta Exposition was that of the Thomson-Van Depoele Electric Mining Company, of Boston.

This company, recognizing the large mining and quarrying interests in the South, availed themselves of the privilege of displaying at the Augusta Exposition some of their mining machinery, showing the most recent applications of electricity to mining and quarrying. The exhibit was situated in the center of the large Exposition hall, and attracted great admiration and attention. They had on exhibition one of the latest improved three-cylinder Goulds pumps, operated by a 3½ horse-power, 220 volt Thomson-Houston motor, employed in pumping water into and out of a large tank at the rate of 80 gallons per minnte.

An electric hoist, operated by a 15 horse-power, 220 volt Thomson-Houston motor, is employed in lifting and lowering a large cotton bale some 50 feet by a rope suspended from the ceiling. This hoist, which is one of the many different sizes and capacity made by the Thomson-Van Depoele Company, has a lifting capacity of 2,500 pounds and a rope speed of nearly 200 feet a minute.

Great interest and attention was aroused by the performances of the Van Depoele electric percussion drill, which was exhibited in practical operation, cutting a large block of granite set in the floor. This drill obtained its power from a Thomson-Houston D7½ 220 volt compound wound generator equipped with rotating brushes and run from a 500 volt, 7½ horse-power Thomson-Houston motor, obtaining its power from the Augusta Electric Railway lines. When in full operation this drill cuts through the piece of granite in use at the rate of six inches per minute, using a bit one and one-half inches in diameter, making 400 strokes per minute and only expending three horse-power.

An electric coal cutter, operating on the same principle as the percussion rock-drill, was also exhibited. The Thomson-Houston Company have on exhibition, in actual use, one of the Thomson recording watt-meters. Over the exhibit hung the sign, "Thomson-Houston," spelled by 150 incandescent lamps, which, when lighted up, shed a glittering radiance that was very attractive.

The exhibit was in charge of Mr. Francis W. Willcox, of the Southern office of the Thomson-Houston Electric Company, of Atlanta, assisted by Mr. Charles Fay, of the expert department of the Thomson-Van Depoele Electric Mining Company, from the factory, at Lynn, Mass. The exhibit was a very practical one and showed in the most direct manner what an important and practical application electricity has to the operations of mining and quarrying.

EXHIBIT OF THE THOMSON-VAN DEPOELE ELECTRIC MINING COMPANY AT THE AUGUSTA, GA., EXPOSITION.

Taxation of Electric Lighting Companies.

Where an electric lighting corporation was incorporated in New York in 1880, under Chapter 37 of the laws of 1848, relative to the formation of gas light companies, which were by a later act authorized to use electricity instead of gas, but the corporation in question never produced anything but electricity, the New York Supreme Court, General Term, held (People *ex rel* Edison Electric Illuminating Company *vs.* Wemple) that the company was not a manufacturing corporation, and as such exempt from taxation upon its franchise. The court said: "Whether such a company is a manufacturing company seems to depend upon the question whether electricity is manufactured by the relator, or whether it is already in existence, and is simply collected or gathered by the relator and utilized. The processes adopted by the relator are stated in the case, and we have the differing opinions of learned experts laid before us. As a scientific question it would seem to be still in the debatable stage. Something also seems to depend upon the definition of terms. * * * * Following our impressions, however crudely formed they may be, we conclude that electricity exists in a state of nature, and that the relator collects or gathers it, and does not manufacture it. We refrain from any exposition of the premises upon which this conclusion is based. If this conclusion is true, the relator is not a manufacturing corporation, and, therefore, not within the exemption of the statute."—*Bradstreet's.*

ELECTRIC LIGHT NEWS

—— An electric light company is projected at Tucson, Ariz.

—— During a severe storm last week two electric light towers at Allegheny, Pa., were blown down.

—— The Caribou, Me., Water Company is preparing to establish an electric light and power station.

—— According to the *Torchlight*, the arrival of the electric light at Shelbina, Mo., was celebrated with fire-crackers and fire-water.

—— The corporation of Manchester, England, proposes to borrow the sum of three-quarters of a million of dollars to erect an electric lighting plant.

—— The Russian government has recently completed the work of lighting the harbor of Odessa with electric lamps, the plant consisting of 64 arc and 8 incandescent lamps.

—— Electric light stock is going up in Bangor, Me. The company is putting in 100 to 150 new lights per month and has been obliged to set up a big new dynamo at Veazie.

—— At a special meeting of the Board of Directors of the Wayne, Pa., Electric Light Company, held last week, Mr. James C. Pinkerton tendered his resignation as president. The office will not be filled until the annual election in July, vice-president James W. Cooper assuming the duties in the meantime.

—— The gas commission of New York city met last week and decided that it would be to the advantage of the city if electricity could be substituted for gas without paying an exorbitant rate. Secretary McCormick was instructed to advertise for bids which will be opened at the next meeting of the board on December 10.

—— A number of Duquesne, Pa., citizens have arranged to apply for a charter for an electric light company. Since they placed the movement on foot it has been discovered that H. H. Swaney, Esq., Dr. T. L. White, Thomas Reynolds, G. L. Reiber, James E. White and Henry Reiber, are also after electric light privileges in the same town.

—— The Massachusetts State board of appeals has given hearing to several corporations which claim that their shares have been taxed for more than their market value. Among them was the Webster Electric Company, whose taxes had advanced 20 per cent. this year. The company succeeded in having their tax reduced to a satisfactory amount—the same as last year's.

—— Some of the stockholders in the Neversink Mountain Railroad Company have given notice that they will apply for a charter of incorporation for the Neversink Light, Heat and Power Company. It is proposed to utilize the plant of the Reading, Pa., Company at the big dam, which is now capable of exerting 400 horse-power, and can be increased enormously by putting in additional wheels. The power station can be operated with very little expense, and the new company will likely put in bids for lighting the city.

—— In the center of the Horticulture Building, at the World's Fair, will be a miniature mountain, 70 feet high, upon which will grow giant tree ferns and palms and other vegetation, finding there a congenial home. Beneath this rock mountain will be a cave, 80 feet in diameter and 60 feet high, brilliantly lighted by electricity, where, during the whole six months of the Exposition, the experiment will be tried whether plants will grow under electric light as well as under sunlight. Chief Thorpe, of the Floriculture Division, originated the plan.

A PROGRESSIVE MOVE.

THE ELEKTRON MANUFACTURING COMPANY'S NEW PLANT AT SPRINGFIELD, MASS.

The selection of a suitable manufacturing site is one of the most important problems that confronts a live manufacturing company. A solution, and a correct one, is often imperatively and immediately demanded. High rents, inaccessibility, poor light and lack of room for expansion, are a few of the many causes which in the end drive manufacturing businesses from large cities to smaller places, very often to the great advantage of the latter.

The selection of the city of Springfield, Mass., by the Elektron Manufacturing Company as the site of their new plant should prove a matter of mutual benefit, both to the town and to the company, as a brighter, cleaner or more wide-awake place of its size would be hard to find. Springfield is in all respects a modern city, with splendidly laid out and well kept streets, fine business houses and beautiful residences, electric street cars and electric lights and first-class hotels. It cannot but be benefitted by the acquisition of such an establishment as that of the Elektron Manufacturing Company, not only in the additional business interests it brings with it and the employment it furnishes to local workmen, but in the capital and citizenship of such a firm.

The factory is situated on high ground facing on Wilbraham street and within a stone's throw of the Armory Hill station of the New York and New England Railroad, from which a side-track runs to the works and enables heavy pieces of machinery to be loaded directly into the cars.

The main building, as shown in our illustration, is of brick, 40x55 feet and four stories in height. From this extends a long wing, 125x40 feet, also of brick and three stories high, in which are located the main work rooms. On the north of the main building, and separated from it by a 15 foot passageway, is the engine and boiler house. This is a brick building, 40x45 feet, divided into two equal parts, in one of which is the boiler, an 80 horse-power Hennessy, and in the other a Buckeye engine of 110 horse-power. The engine is run at an average of 110 revolutions to the minute, and power is transmitted from it to the countershaft by a 24 inch belt 85 feet long. From this countershaft a 16 inch belt passes through a covered bridge over the driveway to the main shafting in the large building.

The main entrance is by a broad stairway leading to the second floor, where are located the offices of the firm, which are spacious, well lighted and handsomely fitted up. Beyond the offices is a large room for shipping and receiving goods. An elevator passes up through this room, and broad stairways lead to the first and third floors.

On the ground floor of the wing, and extending its entire length, is the principal machine shop, and here is located most of the heavy machinery. This room is equipped with over 40 pieces of the finest machines of their kind in the market, and, in fact, the tools used throughout are the best that can be bought. The tool room is located in the center of this floor and tools are issued by the check system. On the north end of this room a blacksmith shop and fire-proof vault, for the most expensive dies and special tools, has just been built, and on this floor of the main building is a large room for storing raw material, and also a room equipped with complete apparatus for nickel plating and brass polishing.

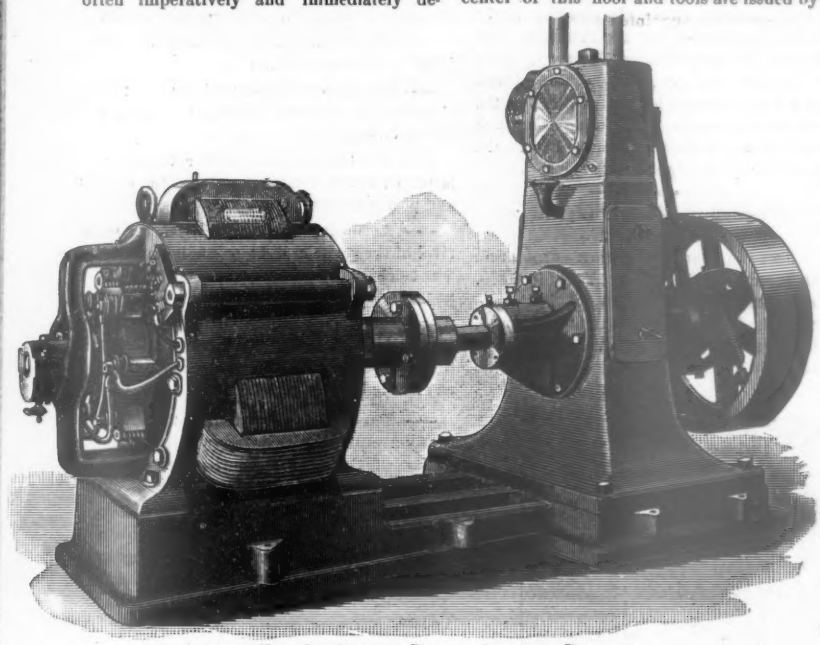


FIG. 2.—PERRET DIRECT COUPLED DYNAMO.

On the second floor of the wing are located the testing and assembling departments. On the right, as shown in the illustration, are the Perret dynamos for generating current for testing purposes. There are usually three or four of these in operation. Power is transmitted from the main shaft to the clutch pulley on a countershaft, and by belts from various pulleys on this countershaft to the several dynamos. By throwing out the clutch the dynamos may be stopped without stopping the shafting. Beyond the dynamos is the switchboard, fitted with all the controlling devices necessary for testing all sorts of motors and dynamos.

Here, also, is located the Emerson power scale, a novel but most efficient apparatus for determining the exact amount of power applied to a dynamo or developed by a motor. On the opposite side of the testing room are the batteries used for testing small motors and circuits, also the revolving fans and dynamos which are used as a load for motors in testing them, it being considered essential that every machine should be run for several hours under full load and for some time on an overload before shipment.

This floor also contains the storeroom for finished parts, each separate part of each machine having a compartment distinctly marked, so that all confusion is avoided and the storekeeper can tell at a glance just how his stock stands.

In the assembling department, just beyond, the finished parts are put together and the machine completed. Here also are the rheostat and commutator departments.

The third floor of the wing is devoted to the insulating and winding department. On the right of the entrance is the hot room, in which, after being wound and shellaced, the field magnets and armatures are thoroughly dried. The temperature of this room is kept at about 200 degrees.

This floor in the main building is divided into a room where all the patterns are stored in a systematic manner, a storeroom for finished machines and the drafting room.

The building is heated throughout by steam and lighted by electricity. At present there are about 200 incandescent lights. This number will shortly be increased.

So much for the plant. We also present herewith illustrations of two of the company's leading specialties, as at present constructed, *i. e.*, the Perret multipolar dynamo and motor. In all essential points the construction is the same as that of the first one which was brought out about two years ago. The only changes which have been found necessary have been in the minor details of the frame. In this respect the machines are quite remarkable and are a constant testimony to the genius of Mr. Perret as a designer.

For isolated plants, these machines possess unusual advantages, by reason of their high efficiency, perfect regulation and the small attention required. In these machines the reduced speed is obtained without increase of weight or of space over the ordinary, and for this reason the dynamos are in great demand where economy of space is important, as on board ship. Most of these machines are shunt wound for giving constant speed where this is an important requirement, but there are many in operation that are wound especially to suit special work.

One of the neatest applications of this sort is the system devised by Mr. Perret for organ blowing plants. These have given such invariable satisfaction, that several organ companies have adopted them exclusively. Perret motors are also furnishing the power for printing daily newspapers in a number of cities and doing it very satisfactorily. Among other things indicating the progressive spirit of the company is the arrangement which has been entered into by them with the Springfield Trades School. Under this arrangement the company receives into their shop 20 apprentices or students, and agrees to give them an opportunity, during a three years' course, to learn the machinist's trade in conjunction with their other studies, working three days a week alternately in the shop, and devoting the balance of the time to a special course of study in such branches as would be of most service to them in the mechanical line.

It has been a cause of regret that there has seemed to be in our industrial system nothing to take the place of the old apprentice system, which has practically passed out of existence, but this arrangement at the Elektron works, if it proves a success, and it now looks that way, may prove a solution of the problem. At all events, the scheme is a creditable one, both to the managers of the Elektron Company and to those of the school.

The officers of this progressive company are as follows: W. D. Sargent, president; W. E. Wright, vice-president; John C. Reilly, secretary; E. H. Cutler, treasurer and manager; Frank A. Perret, electrician.

FIG. 3.—INSULATING AND WINDING DEPARTMENT, ELEKTRON MANUFACTURING COMPANY, SPRINGFIELD, MASS.

PRACTICAL NOTES ON THE REFLECTING GALVANOMETER AND ITS ACCESSORIES.

BY J. D. BISHOP.

II.

THE GALVANOMETER ROOM.

The choice of the position of a galvanometer room will be dependent upon the nature and proximity of the material to be tested, to which it should be as near as possible, so as to avoid long leads, which are objectionable; for the same reason it should not be too far from the battery room. It would seem to be the almost universal practice in the United States to place the galvanometer in any hole or corner or any convenient shelf where it is out of the way, regardless of the convenience or comfort of the observer or the exigencies of his work. The galvanometer, lamp and scale, are often placed in a wooden box, with a sliding front or end, to keep out the surrounding light, which the observer has to screen off the best way he can and thus give his eyes unnecessary work looking for a feeble spot of light reflected from a dirty mirror and coming from a paltry little 35-cent kerosene oil lamp.

If you wish to work properly and with the smallest amount of discomfort and fatigue, provide for the galvanometer a room not less than 10 feet square, well lighted and capable of being maintained at a uniform temperature. The tables carrying the galvanometer, keys, switches and other accessories, should be placed in such a position as will allow the operator to walk round them.

If there is too much light, some may be screened off by curtains, hung by rings sliding over a rod. There is no necessity whatever for having the galvanometer room dark and gloomy, on the contrary, better observations can be taken and the work rendered less fatiguing if the room is as light as any ordinary office, and if the instructions given in "How to Set Up a Galvanometer" are followed, the spot may be read with perfect ease, even with an arc light burning within eight feet of the scale. To sacrifice comfort in working and the eyesight and patience of the operator to an inconveniently placed galvanometer, is simply to betray ignorance of the importance of the work he has to do. As far as possible, convenience and ease of working should be the first consideration, if good results are to be obtained. When taking an observation is attended with difficulty, one is often induced to allow a doubtful result to pass, rather than to ensure accuracy by repeating it.

The galvanometer room should be provided with a table or other means of support for the galvanometer itself, a second table to carry the lamp, scales and other apparatus, and a third table or desk, placed at right angles to the last, for the purpose of holding papers and books and making calculations upon. These tables should be the height of an ordinary writing desk, so that, instead of standing or craning the neck in an uncomfortable position, the observer may sit at his ease in a comfortable revolving office chair and swivel himself to the right or the left, as occasion demands.

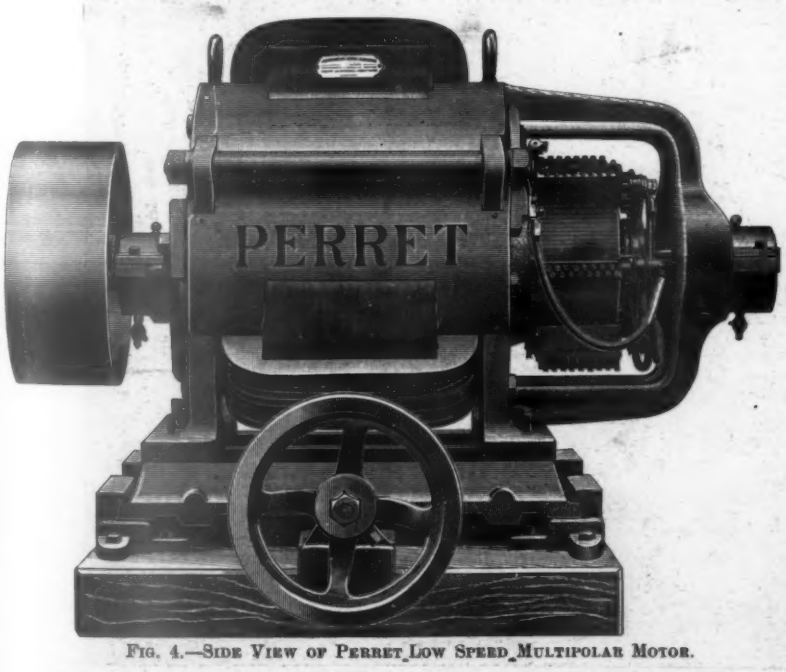


FIG. 4.—SIDE VIEW OF PERRET LOW SPEED MULTIPOLAR MOTOR.

The object of having the galvanometer on a table by itself is to prevent jars and vibrations caused by handling the switches and depressing the keys, which would otherwise produce an unsteady spot. Although the writer claims plenty of light for the room, yet there should be no light which may fall direct or be *reflected* onto the galvanometer or scale. If there is much reflected light the walls and the ceiling may be washed or painted with dead black from the table level upwards.

The room should be kept clean, dry and free from dust, and a large good rough mat placed *outside* the door. If the observer has to pass in and out with damp or wet boots, a good thick perforated India rubber mat should be placed before the testing table as well. The necessity for this will be seen further on.

A good thermometer should be provided and the temperature maintained, by steam pipes or other method of heating, at an even temperature of, say, about 60 degrees F., and to do this the room must be properly ventilated. No matter what the size of the room, nothing should be carried on in it that might distract the attention of the operator and the rule strictly enforced of "No talking to the man at the wheel." The locality of the room should be chosen, if possible, with strict reference to quiet and solidity; for this purpose a cellar or a room on the ground is far preferable to a room on any floor, and a spot selected as far as possible from passing tram cars, engines, elevators or machinery in motion. The means of counteracting the evil effects of any of these are given in "How to Set Up a Galvanometer."

Mr. Rosewater at the New York Electric Club.

The entertainment committee of the Club announce that a lecture will be delivered at the Club House, 17 East Twenty-second street, on Thursday, December 3, at 8 P. M., by Mr. E. Rosewater, editor of the Omaha *Bee*, and president of the Old Time Telegraphers' Association, on "The Government Telegraphs of Europe."

Mr. Rosewater, under commission from the Hon. John Wanamaker, Postmaster-General, has recently made a very thorough investigation of the various European systems of government telegraph, and comes before the Club with data, facts and arguments never before presented. He is himself an advocate of government control of telegraphs and telephones in America, and his opinions are the more important for the reason that he is an old and experienced telegrapher.

Mr. Rosewater's lecture will embrace a number of details, including administrative features, methods of operation, figures of the work, tenure of office by the employés, rates of salary, relations between the government and the press, etc.

Several well-known public men have expressed a desire to be present and participate in the discussion. The evening will be one of the most interesting and enjoyable in the history of the Club. The lecture will begin punctually at the hour named.

Engineering Association of the South.

The annual meeting of the Engineering Association of the South was held in the Y. M. C. A. Building, Nashville, Tenn., on Thursday evening, November 12, 1891, President Jno. B. Atkinson, of Earlington, Ky., presiding, with about 30 members and visitors present.

The president appointed as tellers to canvass the ballots for membership and officers for the ensuing year, Messrs. W. L. Dudley and E. C. Lewis.

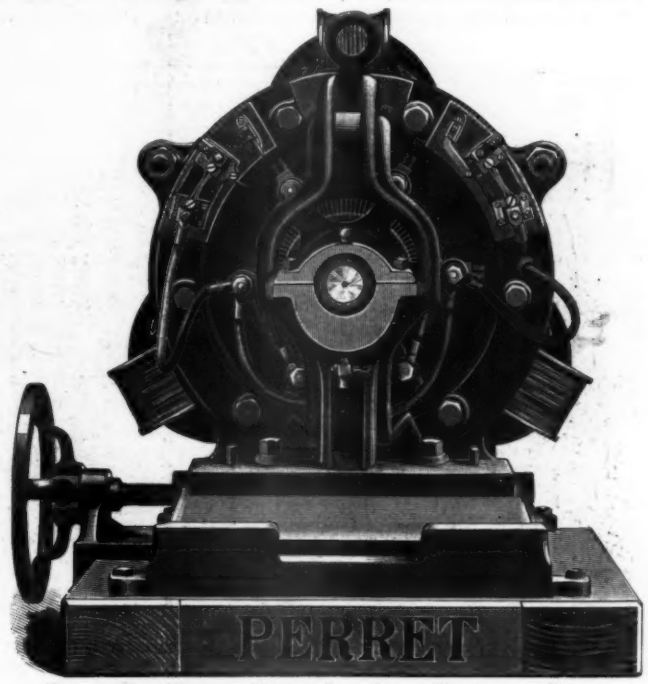


FIG. 5.—END VIEW OF PERRET LOW SPEED MULTIPOLAR MOTOR.—
(See following pages for other illustrations.)

A communication was received from Mr. C. H. Armstead, secretary of the Nashville Commercial Club, extending the courtesies of the Commercial Club to the visiting members of the Association. On motion of Mr. MacLeod, a vote of thanks was returned to the Commercial Club for the hospitalities extended.

A communication was received from the Canadian Society of Civil Engineers notifying the Association that it had been placed on its list for exchanges of publications.

A communication was received from the general committee Engineering Societies notifying the Association that its assessment for the fund to meet the expenses of the engineering headquarters at Chicago during the Columbian Exposition had been placed at $300. As this was in excess of the amount assessed at the time this Association voted to join the movement to establish engineering headquarters, the Association voted to ratify its previous action and to accept the assessment.

Treasurer W. B. Ross submitted the following report:

Received from former treasurer	$377 07
Received from secretary during past year	635 52
Total receipts	$1,012 59
Bills paid on approval of finance committee	609 72
Leaving balance cash on hand	$402 87

Secretary Olin H. Landreth submitted the following report—membership:

	At beginning of year.	Resig'd.	Died.	Additions.	At present.
Resident members	21	..	1	..	20
Non-resident members	70	5	1	11	75
Non-resident associates	2	1	..	1	3
Resident juniors	2	..	..	1	3
Non-resident juniors	5	..	..	2	7
Total	101	6	2	15	108

Deaths: Eben Pardon, resident member; H. S. Butler, non-resident member, of Anniston, Ala. Papers read, 12; papers published, 10. Meetings at Nashville, 7; at Birmingham, 1; at Earlington, Ky., 1; total, 9.

Estimated revenue for coming year:

Cash on hand	$402 87
Due from back membership dues to date	575
Estimated income on basis of present membership	390
Total	$1,367 87

Mr. W. C. Smith announced to the Association as member of Mr. Lucien S. Johnson, engineer and superintendent of mines of the Great Western Mining Company, Peach Orchard, Ky., and as junior Mr. Jno. K. Peebles, draughtsman and assistant engineer, with W. C. Smith, architect, Nashville, Tenn. The tellers also reported the election of the following board of officers for the ensuing year: President, A. V. Gude, Atlanta, Ga.; first vice-president, James Geddes; second vice-president, F. P. Clute, South Pittsburg, Tenn.; secretary, Olin H. Landreth; treasurer, W. R. Ross, Nashville, Tenn. Directors: S. C. Lewis, W. L. Dudley and W. F. Foster, Nashville, Tenn.; Hunter McDonald, Atlanta, Ga.; Jno. MacLeod, Louisville, Ky.; Chas. S. Percy, Montgomery, Ala.

President Jno. R. Atkinson then submitted the president's annual address, which comprised a very carefully prepared exhibit of the engineering features of productive and industrial development during the past year. The address also gave a brief resume of the most striking developments in engineering, particularly in the engineering of transportation during the past year.

On motion, the Association adjourned to the regular December meeting.

Danger of Electrical "Contract."—A Good Point by a Western Daily.

[From the Topeka *Capital*.]

Speaking of an accident in a Texas town the other day, whereby a young man through carelessness lost his life, the local paper says he "was engaged in the perilous work of painting the poles when the punctuation of his life's period was made by the electric spark." It explains the phenomenon in the following technical language: "The insultation of the feed wire at the point of contract had been scraped off."

Young men engaged in electrical work cannot be too cautious in approaching what our contemporary styles the point of "contract" with "insultated" wires, thereby incurring danger of the punctuation of their life's period.

The monster Manufactures and Liberal Arts Building, at the World's Fair, requires more than 200 car loads of lumber, or 3,000,000 feet, for its flooring alone, and five car loads of nails to fasten it down. Three electric saws are kept running night and day sawing and sizing the flooring. Twenty buildings of the size of the Auditorium, or 1,000 houses, 25 by 50, could stand on this mammoth floor.

For a Postal Telegraph.

THE EDITOR OF A VERY BUSY BEE ARGUES THE CASE.—BY GRAPEVINE TELEPHONE TO "KATE FIELD'S WASHINGTON."

"Halloo, Mr. Edward Rosewater, editor of the Omaha *Bee!*"

"What is it? I'm very busy."

"I never knew the time when you were not. You have just returned from Europe, where you have examined the postal telegraphic service, and *Kate Field's Washington* wants to know whether, as an expert, you still think the government should control our wires?"

"I'm firmer in the faith than ever; and having been 13 years a telegraph operator, I ought to know something about the business. For two years I was in the military telegraph corps, and part of that time in the field. Seven years I was manager for the Western Union Telegraph Company, at Omaha, and for one year I served the Atlantic and Pacific and Great Western lines in the same capacity. For more than 25 years I have been convinced that the safety of this government demands the control of the telegraphic system by one of its branches."

"Have you any reason to think that the present system has been detrimental to public interests?"

"Yes. In 1860 the United States and the Dominion of Canada were subdivided and controlled by what was then known as the Six Nations. These telegraph companies had acquired, territorially, the control in various sections of the country, and had agreed among themselves not to invade each other's territory, but to protect and work with each other. The companies were the American Telegraph Company, the Western Union Telegraph Company, the Magnetic Telegraph Company, the Caton Lines and the Dominion Company. They had a powerful offensive as well as defensive alliance with each other. When the war broke out they actively co-operated to protect the interests of each other, regardless of the interests of the government. I was then in the employ of the Southwestern Company, at Nashville, of which company Dr. Green was the president. The headquarters of that company were at Louisville.

"When President Lincoln's proclamation was issued discontinuing all communication between the North and South by wire, circulars were sent by the company to the Northern cities to parties who were carrying on commerce with the South and were in sympathy with the secession movement, to send their despatches by mail to Louisville, and thence they would be forwarded by telegraph. The operations of this and other companies in the Southern States were inimical to the government, and all their exertions were directed against the government. When I was in the War Department, in 1862 and 1863, observing what was going on, I came to the conclusion that the government was not in safe hands. No sooner had the war broken out than the Western Union exerted its influence to acquire control of the military telegraph of the United States. To that end it had its general superintendent, Anson Stager, appointed to take charge of the military lines of the United States. General Stager held two positions at the same time through the entire war—that of general manager of the telegraph system of the Western Union and that of commander-in-chief of the United States military telegraph corps. To show the relation existing between General Stager and his company, I need only to cite one fact. We were always on very good terms, and only a few months before he died he told me that his salary as a colonel and assistant quartermaster in the United States army during the entire war was turned over to the Western Union Company, and that he never got any part of his salary as an army officer."

"When the war was over, what became of the military lines?"

"When I visited Washington in March, 1890, I simply had a surmise that these wires, cables, and everything that we had built during the war had been turned over as old junk or sold at so much a pound to the existing telegraph companies. But upon ransacking the War Department in the quartermaster-general's office, I found that a military order had been issued on February 27, 1866, by which the United States military telegraph lines and appurtenances, within the States south of the Ohio river, were turned over to the several commercial telegraph companies owning the telegraph patent rights within said territory. This was in consideration of the relinquishment by the telegraph companies of all claims against the United States for use of their lines and for the detention of the lines, and as compensation to said companies for the exclusion of commercial business from that portion of their lines which had been in the possession of the United States. The government at that time owned 14,211 miles of land line and 178 miles of submarine cable."

FIG. 6.—EXTERIOR VIEW OF ELEKTRON MANUFACTURING COMPANY'S PLANT AT SPRINGFIELD, MASS.—(See "A Progressive Move," page 212.)

"How much money did they represent?"

"From $2,000,000 to $3,000,000."

"What patent rights existed at that time? Did not Professor Morse invent the telegraph in 1837?"

"Yes; and if he had any patent for stringing telegraph wires on American soil it certainly must have expired within 21 years of that date. I cannot see how any one was prevented or could have been prevented from building just as many wires in any part of this country as they pleased. The only possible patents that might have been interfered with were those upon some instruments. But even the patents on ordinary instruments had run out by 1861."

"Had you rather trust the government than private corporations?"

"Decidedly. We have been told, for instance, that election riots in New York were at least prevented by the telegraph company giving out the proper news to the people as to the result of the election of 1884. What right has the telegraph company to bulletin election news or any other news? Would the government of the United States, if the telegraph had been under its control, publish on bulletins and give away any intelligence transmitted over its wires? Would it violate the mails and open letters which contained such intelligence? Would any express company open the packages that go through its hands? Are not telegraph companies merely public carriers, entrusted with transmitting correspondence?

"But the showing is that the telegraph company received $88,000 for election news in 1889. Eighty-eight thousand dollars for what? For selling returns of State elections and congressional elections at different stations, peddled out to pool-rooms, delivered at the theatres, and at private resorts of every description. That is not, in my opinion, the function of the telegraph, and never should be. Dr. Green at one time testified that the Western Union is the only company in this country that does not deal in news, and yet it has dealt in news to the extent of $88,000 worth of election returns. Now, suppose that Mr. Jay Gould was very deeply interested in election returns; would he be less formidable than any postmaster-general or than any man interested in the outcome of an election? I question it. And yet I do not insist that the government should operate all the wires, although, in my opinion, it would be best if it were done. But if we cannot do that, the next best thing is to devise some plan to connect the postal service with the telegraph service, and give the people the widest latitude in telegraph facilities."

"Would not this service be more costly under government control?"

"I think not. During the discussion of the postal telegraph measure before the National Board of Trade in Washington, in 1888, Mr. Pope, a Chicago merchant, made an exhibit of experience in running a cheap telegraph service between Chicago and Milwaukee. The Western Union was charging for messages between Chicago and Milwaukee 20 cents for 10 words, so some private parties established a system of their own between those cities. Mr. Pope said: 'We were not allowed to build our lines along the railroads on account of some sort of freemasonry existing between the railroad companies and the Western Union Company, and we had to resort to the common highway. After we had built our line we reduced the rate from 20 cents to 10 cents. Immediately upon our doing so the Western Union reduced its rates from 20 cents to 5 cents. With that 5-cent rate against us we paid a dividend in one year as high as 40 per cent., and in two years we wiped out the entire cost of the capital stock of that line; that is to say, the whole sum was refunded to us.'

"Now, this is from the practical standpoint and will not be gainsaid. The fact is that the consolidations which have always followed competition between telegraph

FIG. 7.—MACHINE SHOP AT ELEKTRON MANUFACTURING COMPANY'S PLANT, SPRINGFIELD, MASS.—(See page 212.)

companies in this country have made the plants of the companies excessively costly, while upon the capitalization which these plants represent the dividend would seem to be rather small. It is notorious, however, that there have been enormous profits accumulated in this business."

"The laws of the United States require telegraph companies to transmit government business ahead of every other. Is this done?"

"No. They did not do it on the Pacific telegraph line and they have not done it on any other telegraph line. A message known as C. N. D.—commercial news department—is put upon the wire and has precedence over everything. It ranks everybody's business. The Western Union last year received from the commercial news service something like $380,000 for one year. That commercial news service originated in a little jobbing scheme. During the war, quotations of gold and of certain stocks were sold to banks and speculators. They charged so much a month for these quotations, which were expedited ahead of everybody's business, whether messages for the government, death messages, or anything else. Eventually these quotations made a nucleus around which they built up what they called the commercial news department. It is a sort of a circle within a circle."

"How many post offices have no telegraphic service?"

"Forty thousand. We are told that these people are not entitled to the telegraph. They are 'common farmers' and 'clod-hoppers,' and never use wires, except for an occasional death message. I claim, first, that the 18,000 offices reported to exist at present are not in condition to transmit the business of the people living at those stations."

"What's the matter?"

"In most of the small railroad stations very cheap operators are employed. They are competent to handle railroad business because the same words constantly recur, but they break down on commercial and other affairs. Then these operators are bound to do railroad work first. They get no extra pay for outside messages which are put on the hook, and are as likely as not to be worthless when they reach their destination."

"What would you do if you could carry out your ideas?"

"I would buy out all the telegraph lines in America, and then advertise for proposals to have them operated by private companies under the control of the government, fixing the rates and requiring them to report their earnings from time to time to the government. When the receipts exceeded 10 per cent. upon the invested capital, their investment being rather small, I should insist upon their reducing the rates."

"Why would you buy the existing companies' lines?"

"Because if you leave the present system it will continue to multiply the worthless wires bought from competing companies at enormous rates and be constantly increasing its inflated capital. You see, the Western Union will not remain a quiet spectator of any effort to create a competitor with it by the government, and it might also be unjust to do so. Naturally it will do whatever it can to make the postal telegraph a failure, and if the experiment becomes a failure it will be much more difficult hereafter to establish the postal telegraph, because people will say: 'We have tried it and it has failed.' It could not possibly be a failure if the existing wires were bought, because all the wires are now in operation, and the business would increase and multiply just as it did in England, where it doubled in a very short period, and where the trouble was in not having wires enough."

"Was there not a deficit at first in England?"

"Yes, as in the case of our letter mail when postage was reduced from three to two cents; but in 1890 there was an excess of $500,000."

"What are the English rates for newspapers?"

"One shilling for 75 words during the day and the same charge for 100 words at night. This rate holds good for all Great Britain. In France, Germany and Austria, newspapers have the use of a wire for any length of time, and have absolute control during the time allotted. Here wires must be leased by the year for either day or night, and the company, even then, has a right to use these wires without pay."

"Are there preferred messages in Europe?"

"None but government messages. Here favoritism is shown. Oh, in Germany press messages take precedence. In Austria special accommodations are accorded to the press, such as desk room, etc. Many of the operators are women, who, when not officially engaged, devote themselves to knitting and similar work. Where is such industry seen in this country? In autocratic Austria, too, employés are allowed two weeks' vacation yearly without reduction of salary."

"Is not the pneumatic tube system taking the place of the telegraph in parts of Europe?"

"Yes. There are 50 stations in Berlin, the largest number in any city, population considered. Then the telephone is coming into general use. It has 16,000 patrons in Berlin, who pay only $24.50 a year. This service is much better all over Germany than it is in America."

"Your bone of contention with our existing telegraphic service, as I understand it, is that it is born of speculation and stock-jobbery, that wires are put up by rival companies to be sold out to the Western Union, and that the people pay the dividends on watered stock?"

"That's it, exactly; in addition, the present system puts the nerve-centers and arteries of commerce under one monopoly. The telegraph *must* be a monopoly, but it should belong to the people, who now have no chance. Lines are not constructed where they don't pay. A postal telegraphic service gives a line wherever there is a post office; hence there is no extra expense for offices; in small places the postmaster can be the operator."

"That sounds well. Would such a system simplify the cost of messages?"

"Yes. Government stamps tell the story. Now, nobody knows what messages cost beyond certain well known points. Bless my soul! I've missed an engagement. What did you start me on my hobby for? Good bye."

"Good bye."

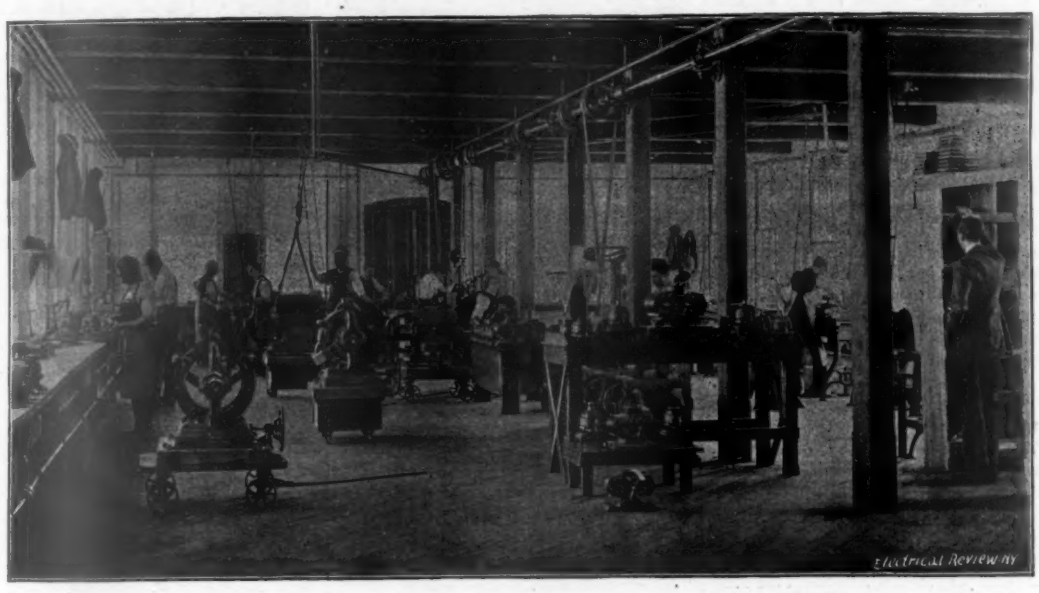


FIG. 8.—ASSEMBLING ROOM AT ELEKTRON MANUFACTURING COMPANY'S PLANT, SPRINGFIELD, MASS.—(See page 212.)

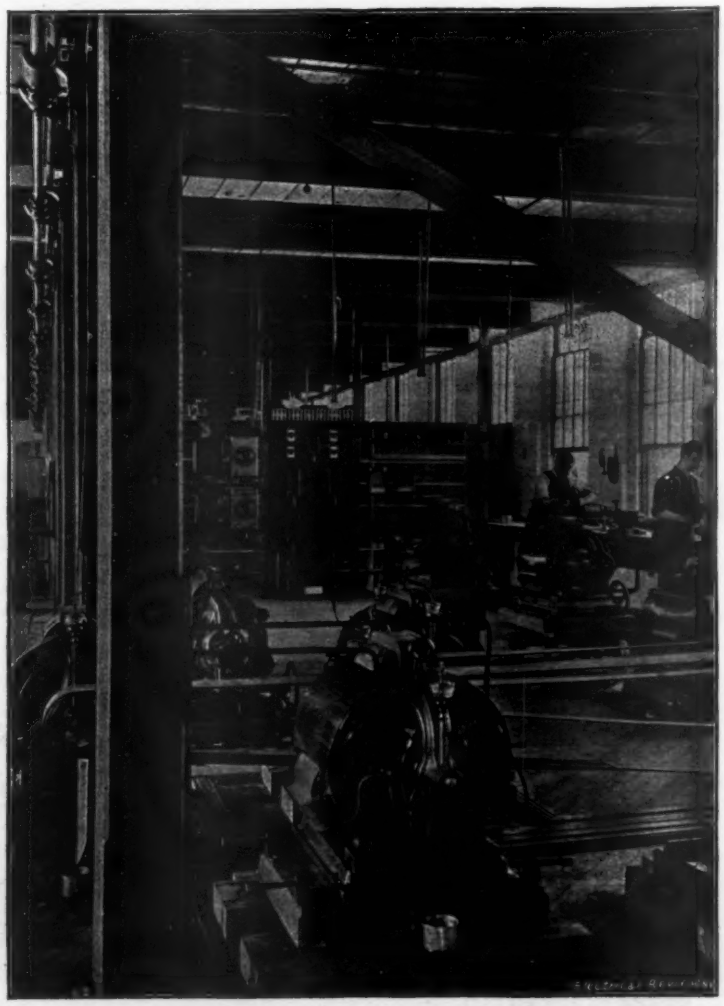


FIG. 9.—TESTING DEPARTMENT, ELEKTRON MANUFACTURING COMPANY'S PLANT, SPRINGFIELD, MASS.—(See page 212.)

PERSONAL.

Mr. J. F. Morrison, of Baltimore, visited New York last week.

Mr. John. R. Fletcher, of Dayton, O., was a New York visitor last week.

Mr. H. A. Cleverly, of Philadelphia, was a recent New York visitor, stopping at the Electric Club.

Mr. R. T. Fraser, of H. B. Prindle & Company, Boston, was a New York visitor last week and paid the REVIEW office a pleasant call.

Mr. Thomas Lowry, the Minneapolis electric railway magnate, stopped at the Fifth Avenue Hotel, New York, for a few days last week.

Mr. H. M. Byllesby, president of the Northwest Thomson-Houston Electric Company, of St. Paul, recently made a trip to the Pacific Coast.

Mr. H. W. Hamblin, who has been interested in electrical work on the Pacific Coast for two years past, has returned to the East and has associated himself with H. Ward Leonard & Company, of this city.

Barry & McTighe, 52 William street, New York, have been appointed consulting engineers for the Atlantic Avenue Railroad Company, of Brooklyn. As a consulting and constructing engineering firm, Barry & McTighe ranks among the best.

Col. W. H. Eckert, widely known in telephone circles, and for several years the practical head of the Metropolitan Telephone and Telegraph Company, of this city, has accepted the general agency of Day's Kerite Insulated Wires and Cables, at No. 16 Dey street, in place of Mr. George B. Prescott, Jr., who has retired on account of ill health. Colonel Eckert is a gentleman of experience in the electrical field, numbers his friends by the many score, and may be expected to make a fine record in this branch of electrical work.

Electric Stock Quotations.

BOSTON, Nov. 28.—The latest electric stock quotations to-day were:

	Bid.	Asked.
Fort Wayne Electric Co.	12 00	12 87½
Thomson-Houston Electric Co.	48 00	
Thomson-Houston Electric Co. pref.	26 25	26 50
Thomson-Houston securities, series D.	7 00	7 12½
Westinghouse Ass'd Trust Receipts	12 50	13 00
Eastern Electric Cable Co. preferred	54 00	
European Welding Co.	25 00	29 00

An Okonite Dinner.

The members of the New York staff of the International Okonite Company sat down to a very enjoyable dinner at the Electric Club last Saturday evening. The *menu* was humorous, the viands tempting and merry wit did sparkle free. After dinner the party adjourned to the theatre, where the performances of Antonio Pastorini in heavy tragedy were witnessed.

It is stated that plans are under way that will result in the building of a dam at Sewall's Falls, in North Concord, Mass., and the utilization of the power for electrical and manufacturing purposes.

KINDRED INTERESTS

Woodhouse & Rawson, United, Limited, London, rendered an annual report to the stockholders of the company at a meeting held November 13. A very satisfactory showing of their large business was made.

T. C. White & Company, of St. Louis, have recently secured the agency of the R. D. Nuttall Company, Allegheny, Pa., manufacturers of electric railway supplies, and will in a few weeks open warerooms and carry a stock of these articles.

The Ries Electric Specialty Company, Baltimore, patentees and sole manufacturers of the Ries regulating socket for alternating current incandescent lamps, have issued a neat pamphlet descriptive of this device and containing numerous complimentary press notices.

Watson & Stillman, New York, have just brought out a new size hydraulic jack especially designed for lifting street railway and other cars. It has a capacity of 30 tons, is 37 inches high over all and has a raise of 22 inches. It has a broad steel base and is admirably adapted for the purpose intended.

Chas. A. Schieren & Company, New York, have just shipped to the Franklin Electric Company, Franklin, Venango Co., Pa., a 20 inch perforated electric double ply leather belt. They shipped them other belts last spring when the station was put up, and they like the belts so much they have ordered a main belt from Schieren & Company.

The Germania Electric Company, of Boston, has recently installed a Germania dynamo for the Fahys Watch Case Company, of Sag Harbor, Long Island. This dynamo is made for the especial purpose of running motors throughout their factory, and, like all other Germania dynamos, is giving entire satisfaction and the demand for them is on the increase.

The Williams Engine Company, Baltimore, Md., has been fully organized and will immediately select a suitable shop. Engines will be manufactured as soon as tools can be placed in position. A large number of orders is already in hand and inquiries are constantly being received. This company will build engines, both simple and compound, up to 250 horse-power. The Southern trade will have the special attention of the Williams Engine Company.

Benj. Sebastian, Jr., 41 Central avenue, Cincinnati, O., having disposed of all his interests in and severed connection with the Sebastian-May Company, of Sidney, O., with which concern he was connected for eight years, has resumed business in Cincinnati, O., under the name and style of the Sebastian Lathe Company, of which he is the sole proprietor. He will at once commence the manufacture of a complete line of foot and power lathes of the very latest and most approved designs.

W. H. Gordon & Company, 115 Broadway, New York, report an increasing and highly satisfactory trade in Sunbeam lamps. Their customers find these lamps all that is represented and after trying a barrel they advise Messrs. Gordon & Company that they will use the "Sunbeam" altogether in the future. All the standard voltages and bases are carried in stock in New York, so that shipments can be made promptly. Mr. Gordon is New York agent for Simplex wires, Bryant sockets, switches, etc., Fletcher's specialties, a superior fuse wire, and other lines, all of the highest in point of excellence and quality.

In the midst of a rush of business such as few concerns can boast of at this season of the year, the Electric Merchandise Company, of Chicago, was obliged during the last week to engage larger quarters. The upper part of the building has been leased and the offices of the company have been removed to the second floor, giving by this more room for stock, as well as adding to the shipping facilities. The decision of General Manager Mason to confine the business to dealing in "electric railway supplies only" has resulted in the company being considered headquarters for such supplies. Thorough understanding of the business, combined with the best manufacturing facilities, makes it a pleasure to do business with this popular house.

Wm. Cramp & Sons' Ship and Engine Company, of Philadelphia, are making extensive changes in their plant and have placed the contract for a new boiler shop with the Berlin Iron Bridge Company, of East Berlin, Conn. This boiler shop will be constructed entirely of iron and will be composed of two parts, one part 55 feet in width by 350 feet in length, made very high between joints on account of moving large marine boilers over each other. This portion of the building is controlled by a 50 ton traveling crane, which is to be furnished by Wm. Sellers & Company, of Philadelphia. Connected with this main portion will be a wing 58 feet wide by 370 feet long, served the whole length by a 20 ton Sellers traveling crane. The building is composed entirely of iron, from the designs of the Berlin Company, and will be one of the most complete in every detail.

Large manufacturing companies are quick to appreciate the advantages of having in their employ experienced and neutral electrical engineers to advise them as to the applications of electricity in their business. This is evidenced by the success in this line which H. Ward Leonard & Company are obtaining. We learn ffom H. Ward Leonard & Company that among the concerns of importance who have recently retained them as consulting electrical engineers are: Wm. Sellers & Company, the well known machine tool builders, of Philadelphia; Otis Brothers & Company, of elevator fame, and the Ingersoll-Sergeant Drill Company. No large manufacturing concern whose product involves the use of power can afford to neglect the rapid progress of electrical motor applications. H. Ward Leonard & Company charge a definite sum per year for their services as consulting electrical engineers, and the manufacturing concerns seem to like this feature of definiteness rather than a percentage charge or a retainer and individual charge for individual service.

IF YOU have anything pertaining to electric machinery you want to sell, send us the description.

IF YOU want anything pertaining to electric machinery, send us your inquiries.

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Electric Light & Power Machinery,

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COR. CLIFF ST.

BRANCHES:

BOSTON, 119 HIGH STREET.

PHILADELPHIA, 226 NORTH 3d STREET.

CHICAGO, 46 SOUTH CANAL STREET.

MACHINERY IN STOCK.

Engine Lathes, 10 in. x 4 ft.; 11 in. x 5 ft.; 12 in. x 6 ft.; 14 in. x 6 ft.; 16 in. x 6 ft.; 18 in. x 8 ft.; 20 in. x 8 ft., with tapes attachment; 22 in. x 12 ft. and 14 ft.; 24 in. and 26 in. x 16 ft.; 30 in. x 10 ft. and 16 ft.; 36 in. and 38 in. x 20 ft.; 42 in. x 12 ft.; 56 in. x 18 ft.; 72 in. x 20 ft.; 108 in. x 22 ft. Fox Lathes, 13 in. x 5 ft.; 14 in. x 5 ft.; 15 in. x 6 ft.; 18 in. x 6 ft. Turret Lathes, 13 in. x 5 ft.; 14 in. x 5 ft.; 15 in. and 16 in. x 6 ft.; 18 in. x 6 ft.; 36 in. x 8 ft.

Planers, 16 in. x 16 in. x 3 ft.; 20 in. x 20 in. x 4 ft.; 24 in. x 24 in. x 6 ft.; 30 in. x 30 in. x 6 ft.; 36 in. x 36 in. x 10 ft.; 42 in. x 42 in. x 12 ft.; 72 in. x 60 in. x 15 ft.; 72 in. x 60 in. x 20 ft.

Friction Shapers, 15 in., 16 in., 20 in., 22 in., 32 in.

Crank Shapers, 6 in., 8 in., 10 in., 12 in., 15 in., 16 in., 20 in., 24 in., 28 in.

Screw Machines, Nos. 1, 2, 3, 4, with or without Wire Feed.

Screw Machines, Nos. 5, 6, 7, 8, Power Feed.

Presses, Nos. 51, 52, 53, Ferracute, Nos. 1, 2, 3, Stiles & Parker.

20 Lincoln Pattern Millers, No. 2.

Hand Millers, Nos. 1 and 2. 3 Cam Cutters.

Bolt Cutters, ¼ in. to 1 in., ¼ in. to 2 in.

2 Profiling Machines. 1 36 in. and 48 in. Gear Cutter.

1 New Horizontal Boring Machine. Newark Machine Tool Co.

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ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE ISSUED ON NOVEMBER 17, 1891.

463,420 Coupling for electric wires; Francis X. Gartland, Philadelphia, Pa.

463,428 Telegraph sounder; James Maret, Mount Vernon, Ky.

463,486 Process of welding metals electrically.

463,487 Electric welding or working of metals; Charles L. Coffin, Detroit, Mich.

463,512 Electrical conductor; Philip H. Holmes, Gardiner, Me., assignor to the Holmes Fibre Graphite Manufacturing Co., Chicago, Ill.

463,544 463,545 Multiple switchboard; Frank A. Pickernell, Newark, N. J.

463,556 Speaking tube attachment for telephones; Leondo H. Snyder, Sharon, Pa.

463,558 Apparatus for measuring and recording electric currents; William Thomson, Glasgow, Scotland.

463,560 Combined telegraph and telephone; Emile Berliner, Washington, D. C., assignor to the American Bell Telephone Co., Boston, Mass.

463,570 Fire alarm; Alphonse Bichet and Robert W. Whitney, Florence, Kans.

463,585 Electric blower or fan; Walter B. Snow, Watertown, assignor to the B. F. Sturtevant Co., Boston, Mass.

463,586 Mast-arm for electric lights. 463,587

463,588 Insulator bracket; Van A. Thomas, Providence, R. I., assignor of one-half to Andrew D. Rose, same place.

463,595 Duplex arc lamp; Ernest P. Clark, New York, N. Y.

463,605 Circuit and switch for electric motors; Wilhelm Lahmeyer, Frankfort-on-the-Main, Germany, assignor to W. Lahmeyer & Co., same place.

463,606 Automatic fire alarm system; Gilman W. Brown, West Newbury, Mass., assignor of one-half to Hayden Brown, same place.

ISSUED NOVEMBER 24.

463,615 Electric controller for elevators; Wm. Baxter, Jr., Baltimore, Md., assignor to the Baxter Electric Motor Co. of Maryland.

463,635 Brush holder for electric motors; James E. Lyons, Cleveland, O.

463,639 Electric motor mechanism; Samuel E. Mower, New Haven, Conn., assignor to Henry G. Thompson & Sons, same place.

463,671 Armature core for dynamo-electric machines; Elihu Thomson, Lynn, Mass., assignor to the Thomson-Houston Electric Co. of Connecticut.

463,693 Electric motor and generator; Imie E. Storey, Boulder, Colo.

463,694 Commutator for electric machines; Willis W. Vail, Quakertown, N. J.

463,704 Electric motor and dynamo; Albert L. Parcelle, Boston, Mass.

463,711 Electric meter; Anthony Reckenzaun, London, England, assignor of one-half to James A. Pentz, Philadelphia, Pa.

463,715 Conductor and guide for electric railway trolleys; Joseph L. Conklin, Brooklyn, N. Y.

463,720 Electric arc lamp; William S. Hays, Troy, O.

463,748 Carbon brush lamp for dynamos; Sherburne Morse, Arkansas City, Kans.

463,754 Electric cigar lighter; George N. Engert, Springfield, O.

463,760 Electric conductor for railways; Charles E. Sargent, Chicago, Ill.

463,761 Section insulator and lightning arrester for electric railroads. 463,762 Electric arc interrupter; Elihu Thomson, Swampscott, Mass.

463,763 Lamp socket; Ferdinand Voigt, Bockenheim, near Frankfort-on-the-Main, Germany.

463,764 Multiple fuse cut-out; George K. Wheeler, Chicago, Ill., assignor to the Thomson-Houston Electric Co. of Connecticut.

463,765 Trolley for electric railways; George H. Alton, Lynn, Mass., assignor to the Thomson-Houston Electric Co. of Connecticut.

463,766 Switch for electric railways; Francis O. Blackwell, Boston, Mass., assignor to the Thomson-Houston Electric Co. of Connecticut.

463,770 Electric cut-out; Edwin W. Rice, Jr., Lynn, Mass., assignor to the Thomson-Houston Electric Co. of Connecticut.

463,773 Means for suspending electric lamps; Thos. H. Brady, New Britain, Conn.

463,785 Electrical surgical instrument; Frank L. Connable and Thomas V. Harper, Xenia, O., assignors of one-twelfth to Augusta Mason Connable and Fanny M. Connable, both of same place.

463,793 System of electric lighting; Edgar J. Hodgson and Joel W. Stearns, Jr., Denver, Colo.

463,802 Electrical transmission of power; Harry W. Leonard, New York, N. Y.

463,808 Electric subway switch; Louis A. Fehr, New York, N. Y.

463,809 463,810 Machine for covering conductors; Christophe Klotzbach, Passaic, N. J.

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